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[For a description of climate regions of the Indian sub-continent and its general effects on agriculture and health, see 6: Spate AW1 India, category 116, pp. 40-62.]

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In a few places are table-lands; they are flat spaces surrounded by mountains; too wide to be called valleys, I thus differently class them. The most remarkable are the Deosai plateau, and the plateau of Lingshithang and the Kuenlun plains; the former is 12,000 or 13,000 and the latter 16,000 to 17,000 feet above the sea. 133

With these great variations of level the climate must necessarily be different for every region. The temperature ranges from the more than tropical heat of the Panjáb summer to such an intensity of cold as keeps perpetual snow on the mountains.* In the inhabited places even the variation is such that in the lower parts the fashion of the poor of India of going almost unclad is followed; in the higher, sheep-skin coats are wanted for protection against the cold, and people are, in places, confined to their houses by snow for seven months in the year. 132

Besides temperature, there is the element of moisture, which gives another variety to the climate. We may distinguish roughly countries of four degrees of humidity:—

(1) Where the periodical rains prevail.

(2) Where the periodical rains do not reach, but there is rainfall enough for all crops but rice without need of irrigation.

(3) Where no crops can be raised without irrigation and the hill-sides are for the most part bare, but some forest grows on portions of the mountain slopes.

(4) Where no crops can be raised without irrigation, and the whole country is bare both of forest and of pasture; this tract is nearly rainless.

The greatest degree of difference in aspect of country, and probably in absolute degree of moisture, is between the first two on the one hand and the last two on the other.

The first region includes the Outer Hills and the Middle Mountains. The second is Kashmir. The third and fourth are on the far

* For the altitudes at which perpetual snow occurs see Chap. XXII., under the heading "Snow Line."

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132 side of the great watershed range; the third, which may be said to have a semi-Tibetan climate, includes Astor with some parts of Gilgit and Baltistān, and the fourth, that which enjoys the Tibetan, or almost rainless, climate, takes in the rest of Gilgit, the greater part of Baltistān, and all Ladākh.

663 101 Now let us enter on the subject of the peopling of this country, of the races of men who inhabit it. Varied as it is in form and other physical characters it is little less so in its population. The several tribes that dwell here, dotted over the lower hills or sheltering in the valleys that divide the loftier mountains, are, some, of widely different origin, and some, though of nearer relation, still of widely different character. There is here to be found, by one who would work it out in detail, ample illustration of the principles of Ethnological Science and a store of facts to fill in parts of it where our knowledge is wanting. All that I myself can hope to do is to put down some of that information which can be acquired by a traveller not trained to these inquiries.

The following is the list of the races which have a distinct geographical distribution, and such characteristics as to render the description and separation of them practicable.

Aryan.

Dogrā. Kashmīrī.
Chibhālī. Dārd.
Pahārī.

Turanian.

Tibetan: subdivided into Baltī, Ladākhī, Champā.

This classification is more national than tribal. For the southern parts especially another division might be attempted—that is, one according to castes. But though certainly such a classification would tend to throw more light on the origin, the sources, of the different tribes, yet in the present state of our knowledge, without more detail as to the subdivisions of castes than we have at present, it would not be practicable, and in any case would not be one that could be expressed on a map as I have done with that here

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133x 5000; their outer base, where they rise from the plain, is about at the former level, and some points of the more inward ridges reach the latter; but the more usual altitudes are from 2500 to 3500 feet for the ridges, and from 1800 to 2400 feet for the intermediate longitudinal valleys.

In trying to give a detailed account of this area I shall first say a few words on the characteristics of the plain country that lies in front of the hills, and then, dividing the Outer Hill region into two parts, eastern and western, describe them in succession, taking first that which lies between the Rāvī and Chīnāb rivers, and next that which extends from the Chīnāb river to the Jhelam.

THE PLAIN IN FRONT OF THE HILLS.

132 133x 134 Although in the Panjāb generally the humidity is greater the nearer one is to the mountains, yet the last of the plain, that part which adjoins the outermost hills, is a drier tract than what is farther away from them. I find two causes for this; one is that the soil is more porous, being of a lighter loam and liable to have beds of pebbles in it; the other is that ravines, which (originating in the hills) often cut across to depths of 100 feet or more, cause a complete natural deep drainage, and leave the surface somewhat arid.

In this respect there is a strong contrast with the corresponding tract under the Eastern Himalayas, where the hills are edged with the line of swampy ground called the Terai.

The level of this extreme part of the plains may be counted at from 1100 to 1200 feet above the sea. As one traverses it in a direction parallel to the run of the hills one crosses the numerous gullies or ravines (nullah or nālā is the much-used Indian word) which are of varying importance, according as they drain a smaller or a larger area. Many of these are dry in ordinary times, but show by their pebbly bed that water sometimes flows along them with force; these are they which rise on the outer slope of the first ridge. Then there are some which are never wholly dry; they usually have a small stream of water meandering over a wide low-level flat, cut down below the general level of the plain; these rise

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farther back in the mountains, in the second or third ridge; they drain a larger area, and are subject to sudden falls of rain; such water-courses will in certain seasons be filled for a time by a wide and swift river, discoloured with red mud in suspension, carrying down in this way, as well as by dragging sand along the bottom, large quantities of material from the hills to the lower grounds and to the sea.

These ravines[1] are from a few hundred yards to a mile wide; they are bounded by a sudden bank, often cut into a river cliff of a hundred feet in height that shows to view the sandy and loamy strata. Their flat bottom is mostly sandy; it is sometimes covered in part with the long tufty jungle-grass called in these parts *khar*.

The plateaus between these ravines[1], though, as before said, somewhat dry, have in great part been brought under cultivation; here, as the crops depend entirely on the rain, their yield varies much with the years.

The tracts where the jungle-grass abounds are frequented by the black-buck or antelope, which indeed, encouraged by the game-laws of the country, spread into the cultivated parts and even herd with the cattle. Near these grassy tracts the villages are composed of pretty thatch-roofed houses; in India straw is never afforded for the purpose of thatching, it is all used as food for the cattle; indeed from the way the treading out the corn on the threshing-floor is carried on no whole straw is left, so it is only where some such material as that stiff grass can be got from the jungles that any thatching is done.

The 70-mile strip of plain extending from the Rāvī to the Chināb is crossed by two large streams that deserve separate mention. These are the Ujh, that debouches by Jasrota, and the Tavī, that comes out of the hills by Jummoo. They are both rivers of perpetual flow and considerable, though much-varying, volume. They rise in the mountains at the back of the Outer Hills at an elevation of 13,000 or 14,000 feet, but not from hills of permanent snow; they have a course among the hills, the Ujh of some 50 and the Tavī of 80 miles, before they reach the

1 [i.e. in the plains of SOUTHERN JAMMU. -- ANALYST]

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plain. The city of Jummoo is on the outermost range where the Tavī passes out through it; the town of Jasrota is in a corresponding situation on the banks of the Ujh River.

Both of these rivers are very liable to floods; these occur both in the time of the periodical rains of summer and in the season of the more irregular winter rains; the floods come down with great force, and for a time render the rivers impassable either by fording or by ferry; they can then only be crossed on inflated skins, and so the traffic of the road is stopped for some hours at a time. It is these floods that carry stones of considerable size, a foot or two across, down the bed for several miles, beyond the outskirts of the hills; the Ujh especially, which has a steeper bed and is liable to quicker floods than the other, brings down boulders of large size; even at a distance of four miles from the hills they are to be found from 2 to 3 feet in diameter. From both the Ujh and the Tavī small irrigation canals are led, so that in certain restricted spaces the cultivation is of a more productive character.

The Chīnāb, which is a great river of large volume, debouches into the plain country by the town of Akhnūr. Down to that spot the stream of it is so broken by rapids as to be unnavigable, but from Akhnūr, where its level is 1100 feet, down to the sea, boats can traverse it. At Akhnūr the Chīnāb divides into various channels, which fertilize the tract called Bijwāt, another of those places to which irrigation gives exceptional fertility. Part of this watered tract belongs to the Maharaja and part to the British Government.

Leaving the river and examining the country on the west of it, we find that generally to correspond with what we saw in the eastern part between the Rāvī stream and this Chīnāb river.

All along to Bhimbar, past the villages of Mināwar and Barnāli, lies the strip of drier plain. It is a plain with slight depressions, which occur where one crosses the sandy or stony stream-beds. Most of these stream-beds are quite dry for the greater part of the year, but there is one that holds a continuously-flowing river. This stream is the Mināwar Tavī, so called to distinguish it from its sister of Jummoo; rising a good way back among the mountains, from the Ratan Range behind Rājāori, it finds its way

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133X The Jhelam River, as it passes this tract, flows often between steep rocky banks several hundred feet high; anon it reaches a spot where a ravine coming down makes its margin accessible; again for a time more gradual slopes, or smaller cliffs that edge some plateau, form its banks; still again it comes between high cliffs, and in deep curves finds its way round lofty promontories, such nearly isolated spots being often fort-crowned, as where Rāmkot and Mangla stand; then, at last, it debouches into the plain, where it is bounded by low banks, and finds room to spread and divide, to form islands with its ever-varying channels, and otherwise disport itself as a river delights to that has escaped from the mountains that restrained it.

CLIMATE AND VEGETATION.

132 It was necessary, in order to give a connected view of the form of all this tract of country, to confine one's description to that subject, and not linger by the way to tell of other things. Little has been said about the climate or the vegetation; but now, although I am not in a position to give much information about them, a few remarks applicable to the Outer Hills generally may be useful.

For climate the year may be divided, as in the plains of India, into three seasons; here they thus extend:—the hot weather, from April to June; the rains, from July to September; the cold weather, from October to March. Taking the more inhabited portions of the tract, of which the altitude may be from 1200 to 2000 feet, we find that in May and June they experience a severe heat; the rocky surface of the ground becomes intensely heated, and gives rise to hot winds, which blow sometimes with regularity, sometimes in gusts. At night the temperature falls to a greater extent than it does at the same season in the plain of the Panjāb; for the rocky surface loses its heat again, and the irregularities of form produce currents which tend to mix the heated air with the cooler upper strata.

The rains, beginning first among the higher mountains, spread down to the outer ranges in the latter half of June, and, though

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often breaking off, seldom cease for the season without affording moisture enough for the bringing on of the summer cr[illegible].

The rains ending with September, the country is left dry for a time; its uneven form prevents the soil from retaining much moisture; by the drying of the country, and the decline of the sun's power, the cold weather is introduced. This is a delightful season—a pleasant bright sun and a cool bracing air make it one refreshing and invigorating after the dry heat of the first part of summer, and the warm moisture of the latter months. This bright cold weather is, however, varied by rainy days, which bring rather a raw cold; showers may be expected about the 20th of December, or between that date and Christmas time; and on the higher ridges, at 3000 and 4000 feet, snow falls, melting almost as soon as it falls. It is this winter rain that enables the peasant to proceed with the sowings for the spring crop, and on the occasional recurrence of such showers during the next three months he depends for that harvest which the increasing warmth of the months of March and April is sure to bring on well if the rain has been fairly plentiful.

The only part of the year at all unhealthy is the latter half of the rains; the natives date the beginning of it from the flowering of the rice; it may be said to extend through part of August, September, and part of October; during that time intermittent fever much prevails. The type of fever is somewhat worse than what abounds at the same season in the Panjáb; it is more of a jungle-fever, less regular in its times, and less easy to get rid of. In some years fever is exceedingly prevalent over the whole of this tract. I have heard that Ranjít Singh's father once took advantage of the inhabitants of the lower ranges being stricken down with it to make a raid on Jummoo.

The vegetation of the Outer Hills is for the most part of the dry-tropical character.

The very outermost ridge, as before said, is covered with a more or less dense forest of small-leafed acacias (*A. Arabica* and *A. modesta*, called by the people *Kikar* and *Phulái* respectively), with some of the *Ber* tree (Zizyphus jujuba) intermingled, and an

1; Drew G-3 (1862-1872) 1875 AV1 Kashmir AV/

243 an extent which varies with the height above the sea. Hence the wheat does not ripen till it is too late to sow maize or millet. But some land being reserved for the first kind of crop and some for the other, they have, in a sense, two harvests.

132 Snow falls over all the tract. In the lower parts it just falls and melts; but in most it stays for months, and in some as long as five months. It is this circumstance of duration of snow that causes great distinctions between the inhabitants and the customs of these hills and of the Outer Hills, some details of which will be found farther on.

The further account of the region can best be given by taking for examples and describing some of those parts which I am most acquainted with.

RAMNAGAR TO BHADARWÂH.

133x A march from Rámnagar to Bhadarwáh, Kishtwár, and beyond, gave me an opportunity of seeing much of this mountain tract.

Near behind Rámnagar, which itself is counted in the Outer Hill region, rises a bold ridge. This, which can be traced on the large map, is the first of the Middle Mountains.

The road or path over it—one not fit for horses—rose up a long spur that projected from the ridge, till we crossed this at a height of about 8000 feet. The range keeps at this elevation and continues straight for some 25 miles. On the south side it has a succession of such spurs as the one we came up; they first jut out from the ridge at a low angle, then, leaving a high shoulder, the slope becomes more sudden; lower down again it changes to various degrees of steepness, which allow of the ground being in places terraced for cultivation. Between every pair of the rounded spurs is a hollow or ravine, each the bed of a stream of no great volume, but perennially flowing.

133x 137 The surface of the ridge and of the spurs changes. Rocks here and there project; the less steep portions are covered with pasture when facing the south, and with forest on the sun-sheltered slopes; the forest may be of oak, with rhododendron and horse-chestnut among it, or, higher up, of deodar and pine.

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pine-needles hung in light feathery sprays, the spruce boughs in graceful curves, with which contrasted the almost geometrical regularity of the silver-fir branches. The deodar is here, and wherever on the Himalayas I have seen it, much more like a Lebanon cedar than the trees, still young, growing in England would lead one to suppose; the bending form of the boughs, as well as the particular light tint of green of the leaves of the young plant, are lost as the tree gets on in age, and the branches come to jut straight out and to make flat dark-leaved layers.*

Following up the valley, often we met with the river roaring among boulders and over rock-ledges; anon the path crossed it by a bridge, and rose on the right bank for some 1500 feet, and afterwards went along high above the stream. Here we came upon snow. It was the beginning of May—hot summer in the Plains and Outer Hills, spring in the region just past, but we came, as it were, to winter in rising. Across the valley we looked on to a snow-clad slope of some 4000 feet of height, whose summit was a rock-mountain of 13,500 feet. The lower half of that slope was covered, in lines following those sides of the indenting hollows whose aspect was favourable to forest trees, with thousands and thousands of tall straight conifers in dark green foliage, that threw their grey shadows over the bright snow. As the path led on and the valley rose, the bank that faced us becoming nearer, we saw each tree to stand in a hollow in the snow, for this being old, not of a late fall, had both quitted the branches and melted from around the trunks, though still thickly carpeting the space between. On the north side of the valley we were able to find a clear space for the tents to be pitched, the altitude of this camp being 9000 feet.

We had now reached ground of somewhat different character; we had come to a part which the natives call Sonj; it is the

* The names which these trees have here are—silver fir, *rún*, or *rus* (with a nasal *u*); spruce fir, *kor*; Pinus excelsa, *chil*, or *kuthi*; deodar, *diyár*. I think that the names *rún* and *kor* become interchanged not very far off. *Diyár* is the name used for deodar both in the Panjáb (where its wood is well known) and in these hills; but in Kashmír it is called *deodár*, the *o* being pronounced, according to the rules given in the preface, like the *o* in the English word "dote."

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upland space enclosed by the meeting of the ridges, where the Tavi has its source. At this high level there is a spread of gently undulating ground, with rounded knobs and smooth dells, a space pleasant to meet with after the steep slopes and narrow valleys. The higher hills had retired. As one viewed them from the top of some of the mounds, one saw a great difference in the look of those on the north from what we had seen on the south side of the valley. On the north was an amphitheatre made by rugged mountains of grey rock with snow-fields beneath; below the snow the amphitheatre enclosed a thick forest of alpine oak. This I saw when the evening sun was brightening the rounded masses of its foliage, from the midst of which rose here and there the straight forms of some dark fir trees.

The oak, *Quercus semicarpifolia*, in the native language *kreû*, is at this point the highest forest tree. Unlike the conifers, it flourishes on hills that have a south aspect; it grows certainly as high as 11,500 feet, and I think it reaches to close on 12,000 feet; of the firs the limit was only a little above 11,000 feet.

The depth of snow prevented my verifying the thought which came to me on seeing the undulating hillocky ground of this enclosed upland, namely, that the irregularities of its surface were the moraines and *roches moutonnées* of former glaciers. The end of May or June would be the time to follow up the inquiry, as the snow by then would have melted. The stream which we had traced up now divided. I was told that the southern branch came from a little lake called Kalî Kund. This strengthens the idea of glacier-traces, for mountain-lakes have often been caused, in one way or another, by the action of glaciers.* The G. T. Survey have marked the highest summit near—that at the meeting of.

* What appeared to me to be other signs of former glaciers, not very far from this, are the masses of rock which lie in lines in the Bhaderwâh Valley. The large blocks, mostly of gneiss, are sometimes as much as 40 feet long and 20 feet high; they are among an agglomeration of angular and rounded pieces of gneiss and slate. The heaps of the larger masses are seen to be arranged in curving lines, as the side valley they came from bent round to join the main one. I am not quite sure of their being moraines; avalanches perhaps may have had to do with forming them—avalanches of the kind that later on, under the head of Pîrpanjâl, will be described. The linear heaps extend below the level of the town, to, say, 5000 feet above the sea.

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the ridges—as 14,241 feet; it does not bear perpetual snow, but there is a very constant bed near, whence snow is sometimes sent for summer consumption to Jummoo, after being compressed by beating.

The other branch stream we followed to its source. The way led us to a part of the ridge that was depressed, when a few hundred feet of steeper ascent brought us to the Pass, which is 10,900 feet above the sea. The ridge it crosses bears the name of Seval Dhār. This Pass is closed by snow for three months from the middle of December; later in the season than we came it would be practicable for ponies, which, however, would have to be taken up the valley by a somewhat different road than ours.

The gaining of the summit opened to us a magnificent prospect as we looked beyond. On the right was the high peak, on this aspect brilliantly white with snow; from this mountain juts out a mighty spur, whose sides, that descend full 5000 feet, are clothed most thickly with fir forest. Spurs from other parts of the range make long ridges with dividing valleys; their sides, though not rocky, are steep-sloped, some parts of them grassy, some parts dotted with trees, and some completely covered with wood. Where these spurs end off, runs along nearly at right angles to them the Bhadarwāh Valley, a flat gently sloping to the north-west. The town and village that occupy it are in sight. Beyond that again rise hills like what we have near us, dark forest ridges, their spurs part grassy, part wooded. These are branched in such complication that their connection cannot be made out except by studying a map of them. Last beyond—seen clear over these ridges, stretching far right and left along the whole of the space visible between the near jutting hills—is a great snowy range, the one dividing Chamba from Pāngi, the continuation of which reaches to Kishtwār. It is a serrated rocky line, with wide snow-fields in front of it, part of which is permanent snow. Some lofty sharp-pointed peaks rise from the general level of the range; of these one has much the form of the Matterhorn. The higher mountains of this ridge measure 17,000 and 18,000 feet.

Down from the Pass was first a steep descent, which the snow

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made difficult for the laden men, and then a more gradual slope along a spur, through a forest of the same sorts of conifers. The spruce and silver fir flourish most in the high parts, while lower down the deodar and *Pinus excelsa* are most numerous. The trees, as a rule, run to a height of 100, 120, and 150 feet; many are wonderfully straight. In the descent of several thousand feet such as we were now making the changes in all kinds of vegetation are very striking; first below the snow were great bunches of different sorts of primulas; these farther down gave way to other flowers of great variety; deciduous trees gradually became more frequent, and with their fresh spring colours among the dark foliage of the conifers gave new beauty to the forest.

BHADARWÁH.

When we had descended more than 5000 feet we reached the valley of Bhadarwáh. This is a nearly flat-bottomed valley, a mile in width; in length it extends thus open for about four miles, above and below narrowing so as to leave hardly any space between the hill-slopes. The hills which bound it are the ends of spurs from the forest ridges. Some of these spurs have bits of cultivated ground at different levels, and in some places we noticed traces of former cultivation—terraced ground overgrown with young pines, of twenty years' growth or more.

The valley-bottom has a slope of about 3°. The land is terraced to this fall in steps of a few feet each, so as to fit it to receive the irrigating water that here is plentiful enough to provide for a crop of rice. For this, in the month of May, the people were busily preparing, both by ploughing and breaking up the ground with a heavy kind of hoe or mattock. Men and women combined, in gangs of ten or a dozen, were working over the fields, shoulder to shoulder, striking in regular time, and beguiling the hours by singing as they worked a monotonous but not unpleasing chorus. The process that follows—and this, being lighter labour, has not the same accompaniment of song—is pounding the clods with what are exactly like croquet-mallets;

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These characteristics, combined with the presence of numbers of Kashmīrī people who live in the town, have gained for it the name "Chotā Kashmīr," or Little Kashmir.*

More than half of the inhabitants of Bhadarwāh itself are Kashmīrī; these quite throw into the shade the original Hindū inhabitants; they have adopted almost all kinds of employment, numbers of them are shopkeepers, and numbers more are occupied in making shawls, on orders from Amritsar and Nurpūr. Some Kashmīrīs have land, and cultivate it themselves; some, indeed, do this for half the year, and follow shawl-weaving for the other half—during the long snowy winter. Around are several villages of Kashmīrīs; but here, outside the town, they are much outnumbered by the Bhadarwāhīs, the older inhabitants. I could not find out at what time so many Kashmīrīs settled here, but, from the absence of any distinct tradition on the subject, we may conclude that it was at least three or four generations ago.

An elevation of 5400 feet above the sea gives the place at this time of the year an agreeable temperature, that makes it a favourite with many. Sometimes Gurkhās from the British regiment at Bakloh, bringing their wives and families, spend their leave at Bhadarwāh, where they can get the advantages of fine air and cheap living.

On a spur, some 300 feet above the town, is the Fort, a square building of combined wood and stone, with bastions of masonry work. Near by are some remains of the former residence of the old Rajas. The Rajas of Bhadarwāh were Mīān Rājpūts; they were allied, as to caste, with the families that ruled over Basolī and Kulu. This old family was dispossessed about the year 1810 by the Chamba family, who thus combined Bhadarwāh and Chamba. These others held it for twenty or thirty years only, when, through two or three stages of transfer, it fell into the hands of Gulāb Singh, of Jummoo.†

* Another name (which the Hindūs sometimes give to it) is *Bhadarkāshī*, derived, I think, from the sacredness of a shrine there is on the river-bank opposite.

† One account shows Bhadarwāh to have passed from the Chamba family, by way of dowry for one of the daughters of that family, to Raja Hīra Singh, nephew to Raja Gulāb Singh. A short interregnum followed on Hīra Singh's violent death;

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133x in and display the strange hues of their bodies through the shower. The cascade is in greatest force in the spring, on the melting of the snows above, and it was thus I saw it; from that time it diminishes, but it is again increased when heavy rain falls in the rainy season, that is, the late summer; in winter it is least.

361 [366] The small town of Kishtwār is dirty and dilapidated. There are about 200 houses, including a bazaar with some shops; but there was a complete absence of life, of the busy cheerfulness one sees in some bazaars. The people seem to have been brought to a low stage of poverty from having in former years been given over to the Wazīr family, which still holds much influence here. Two large houses, built after the fashion of the houses of the richer people in Kashmir, which belong to that family, are exceptions to the general state of decay. [712] There is an old fort, on a little rising ground, oblong, with corner towers and other projecting buildings: it is manned by some thirty men.

563 [564] The inhabitants are more than half Kashmīrī; the rest are Hindūs of the Thakar, Krār, and and other castes. The Kashmīrīs here, too, carry on their shawl work; there are some twenty workshops for it in the town. In this place, as in Bhadarwāh, they seem to have settled for some generations.

• 132 The climate of Kishtwār is something like that of Bhadarwāh, but it is somewhat warmer, and must have a less fall of rain and snow. Snow falls during four months, but it does not continually stay on the ground; it may do so for twenty days at a time. On the slope towards the river, 1000 or 1500 feet below, it stays but a day. The fruits produced are apple, quince, three kinds of pear, plum, a few apricots, cherry, peach, grape, mulberry, and walnut.

KISHTWAR HISTORY.

175 Kishtwār was governed by Rājpūt Rajas, who in early times probably ruled independent of all others.

The first whose name I can hear of is Raja *Bhagwān Singh*, who must have lived 200 years or more ago, as he was seven generations back from the one who was ruler fifty years ago.

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133x 361 Pādar is surrounded, we might almost say enclosed, by mountains bearing perpetual snow; these give rise to glaciers, which end off at too high a level for them to project into the main valley. Most of the mountains in sight from below are either the [311] rocky or the forest-covered lower slopes. The cultivated part is very small in extent; there is the collection of villages in the four miles below Atholī, where is the widest opening in the whole tract; and there are some small villages at intervals farther up the two valleys. All these together have 400 houses.

131 Atholī, which may be counted the chief place in Pādar, is on an alluvial plateau, 6360 feet above the sea and 200 feet above the river; on the opposite bank is a wider plain, some 60 feet [712] lower in level. At the very point of the meeting of the Bhutnā River with the Chīnāb, only 40 or 50 feet above the water, is the present fort, a little toy-looking affair; it is a square work with round corner towers, built, in the manner of the country, of alternate courses of stone and timber, and plastered over; it is garrisoned by ten or twelve men. Behind the fort are remains of the former town of Chatargarh; these are linear heaps of stones, arranged, on the whole, in a square form. On the same plateau are groups of trees, sheltering some wooden temples and shrines.

133x The Chīnāb, which flows between the two plateaus, comes from the direction of Pāngī through a rock-bounded gorge, in a narrow deep stream; then widening out it sweeps along below Atholī. At the beginning of June, when the sun was fast melting the snows, and the glacier-water was bringing down in suspension a fine light drab mud that coloured the whole river, the rate of the current at this spot was 6½ miles an hour. It is here spanned by a rope bridge; a wooden bridge that for some years had existed, was carried away by a flood about 1865; this probably was the flood which I heard of as having been brought about by a natural damming of the river in Lāhol far away up; the breaking of the dam made the waters rise at Atholī to something like 100 feet above their winter level.

132 The climate of Pādar is severe. From its elevation, and the considerable moisture of its air, there is a great fall of snow in

1: Drew G-3 (1862-1872) 1875 AVI Kashmir AVI

winter. I hear that snow gets to be 3 feet deep and stays 4 or 5 months, and that there is a good chance of it falling at unseasonable times besides. This and a want of sun make it difficult for the crops to ripen. The sunshine is intercepted, not only by the clouds that the mountains attract, but also by the mountains themselves, which shut in the valley so closely. At Atholi I found that the average angular elevation of the visible horizon—that is, of the mountain-summits all round—was 18°. This want of sunshine affects the fruits, which do not well ripen, though some fruit-trees, especially walnut trees, are common. 132

Pādar is one of the few places where I have met with the edible pine, *Pinus Gerardiana;* it is a large spreading tree with smooth bark; scattered individuals of it are found in the forest.* Wild carraway grows here, and is gathered in quantities to be carried to Jummoo for sale; the price in Pādar is about eightpence a pound. 137 222 438

The district we are now in is one of those where deodar forests occur in such positions as make it practicable to fell the trees for timber for use in the Panjāb. The necessary condition is that the slope on which the trees grow should be so near a large stream that without an extreme amount of labour the logs can be moved or slid, without fear of splitting, into the water, where they will float away down the stream. 313

Since the beginning of British rule in the Panjāb the demand for deodar timber has been great. No tree grows in any quantity in the Panjāb which will produce beams fit for a large building. Hence in former times to some extent, but still more since the British came there, the Panjāb has called on the Himalayas to supply it with timber; of all the Himalayan trees the deodar has been proved to be the best to resist the destructive insects, especially the white ants, which abound in the plains.

In the course of years the most favourably situated deodar forests in the Chināb Valley have been felled, and there now remain chiefly trees which either are of a less girth than can be

* The only other part where I have found this tree is near Dūiyān, in the Astor country, as mentioned in Chapter XVII.

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monly from 9 to 15 miles. We shall divide the distance into sections according as the characters of the country change.

JUMMOO TO AKHNÚR: ONE MARCH.

The length of this stage is 18 miles; it is a long march, especially for a first day's, and it might be conveniently divided into two; Nágbaní at 7½ miles would be the intermediate halting-place. The road, however, is easy, being altogether in the plain. For the first few miles from the city we pass through a narrow lane cut in the acacia forest, the lane bounded by tall hedges of *Euphorbia*. The forest abounds with wild pig; passing along at dusk one is sure to see several in the path, and there are spotted deer about, but they are shy and one does not often catch sight of them. Emerging from the forest we find ourselves well clear of the hills also, with the view unconfined by the lower ranges. We see in one glance a great length of the mountains that lie between us and Kashmir extending on the right; the look of them varies something with the time of year; I have made the journey oftener than once, and in different months; we will suppose it to be May, when the heat of the plains and of Jummoo has become oppressive, and one looks forward with delight to enjoy the cool air of the mountains.

In May, then, though the lower snow has melted, there remains much on the Panjál hills. High up spread fields of white snow, with both rocky peaks and snowy ones projecting from them. In front of them are the dark forest-slopes of the Middle Mountains, which are well seen in the opening of the Chináb and Ans valleys. The outermost low ridges clothed with green make the foreground.

The road goes on, a well-frequented one traversed by both carts and camels; we pass over a fairly cultivated plain, rather dry in soil; we go by some Government gardens and a few hamlets and villages. As we near Akhnúr we come on the line of an important canal the Maharaja is having constructed to bring the waters of the Chináb to the foot of the Jummoo hill. While we were three or four miles away from the foot of the hills the soil

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133* deciduous trees; along the lower edge, too, a growth of them
137 made a belt of brighter green beneath the dark conifers;—

"Up-clomb the shadowy pine above the woven copse."

133* For 5000 or 6000 feet up, this forest continues along that whole length of 15 miles; in some parts it reaches to the very summit of the ridge, in others the mountain rises above the tree-limit, and there is then a belt of green pasture above the forest, and above that rocky peaks and beds of melting snow.

On the right bank, the north side of the valley, the aspect of the hills is different. Their southern outlook does not favour the growth of wood. For a great height up, their sides are of steep but grassy slopes, broken by rocks and lines of cliff. Still at every mile they show new forms, as, in going along, one opens the successive ravines, and one's view reaches to the higher parts, to the lofty precipitous rocks of the centre of the ridge.

361 Besides these grand beauties of the mountains there are more homely ones in the valley. [a] The path lies through glades shaded by trees of rich and varied foliage, with flowers of jasmine, honeysuckle, and rose delicately scenting the air; it passes by villages which are surrounded by and almost hidden in groves of thick-leaved walnut-trees. Each village grove cheers one by its homely, pleasant, look, and each wilder glade tempts one to stay and enjoy in its shade the combined beauty and grandeur of the mountain views.

•132 The atmosphere of the whole of this valley is distinctly cooler and fresher than that of the Kashmir Vale. On one's reaching Kangan the difference is already discernible; the heats that sometimes oppress one in Srinagar are there left behind. The stream that flows in the valley is one of much volume and velocity, and its waters are always cold from the snow and glacier-ice that it drains from; the road crosses it several times over wooden bridges; as one stands on these one feels a current of cold air, air that has been dragged down from the higher parts by the water, and is kept cool as it flows by its contact with the stream, to which it is closely confined for not a yard beyond its banks does the current extend.

[a] [i.e. the Sind Valley.]

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When one continues up the valley the climate becomes more rainy, and at certain times of the year—as July and August—showers fall almost daily. The crops grown are in part *bārāni*—that is, depending on rain—and in part irrigated; the irrigation cuts are drawn chiefly from the side streams; rice, which is the crop most generally grown by such aid, extends as far as the village of Gūnd, about 7000 feet above the sea; higher up the chief cereals are *china* (one of the millets) and *tromba*, or buckwheat, which last is a most hardy plant, that ripens its grain with comparatively little sun. Towards the head of this valley it is not excess of cold at any time, but absence of sun, from the prevalence of rain-clouds as harvest-time comes near, that limits the growth of the various kinds of crop.

At Gagangīr, which is two days' march above Kangan and four from Sirīnagar, the valley has much narrowed. The river flows at the very foot of the wooded mountain-slope of the left bank, and on the right there is but a narrow strip between the stream and the opposing hills. The cultivation of this strip supports a small village; the walnut-trees that surround it are the last we see in this valley; the level of Gagangīr, which is about 7400 feet, may be counted the limit of them here. Here, too, ends the characteristic scenery of the last few marches; beyond we shall come to scenes of a different kind; but before proceeding to them let us turn to take a look back and cast the eye down the valley. One is struck with what I have often noticed in other mountain valleys after travelling some way towards their sources and then turning back. The mountains seem diminished, seem as if they hardly could be the same that towered above us as we passed along the foot of them; it seems, so, as if the opening of the valley into the plain below must be near at hand; it is difficult to think that there are so many miles to be traversed in a valley deep between high mountains.

Beyond Gagangīr a great rocky ridge on the north side approaches its opposite neighbour on the south, and the valley of the river becomes a gorge through which the waters foam, while the path is carried among the large fallen blocks that fill up the

1: Drew G-3 (1862-1878) 1875 AVI Kashmir AVI

The determining cause of the accumulation of so much moraine matter at this particular spot, Thájwas, no doubt was the narrow gorge below, which made the ice of the side glacier (in an intermediate later time, when the main-valley glacier had retreated as far back as Sonámarg or farther, and so the two had separated) to accumulate, to abut perhaps against the opposite mountain, and, keeping long at that level, to shed the material it carried, some being borne away down the gorge, while that thrown off on the upper side has remained to this day.*

The village of Sonámarg, a couple of miles above Thájwas, has but half a dozen houses; it is with difficulty kept inhabited, for the cloudiness and showery character of its climate combined with the altitude, 8600 feet, make the growth of all crops precarious. The Maharaja's Government gives some advantages to those who will settle here, for the sake of their aid in carrying the post to Ladákh across the Pass; for this is the last inhabited spot in the Sind Valley; no other house is met with until we are beyond the Pass, in the Drás country.

At Sonámarg we no longer have the homely look of the Kashmir village; here no trees shelter the cottages, the plain is bare, and the fields look unpromising. But the mountains that face the village on the north attract our attention; here beds of greyish-blue limestone stand up perfectly vertical and make precipitous slab-like faces of rock across the higher parts of the spurs.

From Sonámarg to Báltal the valley is immediately bounded by hills a few thousand feet high; on the north side they are covered only with grass; on the south they are varied with tracts of forest. In some places the fir wood spreads down to the part traversed by the road; when we get to Báltal the plain again is bare, but some of the lower hill-slopes are covered with birch wood and firs.

Báltal is the last halting-place before the Pass. Here the main stream of the Sind River turns off almost at right angles

* On the steep side of the mountain (E. the right bank of the main river (above the bridge) I observed glacier-striations at a height of about 200 feet above

to describe their direction in words, only the General Map will give to the mind an idea of them. The heights of the peaks may be said to be, in the north-eastern part, a little more or less than 20,000 feet; in the north-western part from 17,000 to 18,000; the levels of the valleys that cut in among them have already been recited, while numbers showing the height of certain snow Passes give the minimum height of the bounding ridges. Thus between the Indus and Shayok valleys comes the Leh Range, whose summit-ridge is from 18,000 to 20,000 feet, with Passes through it at about 17,000 feet. Beyond the line of the Shâyok is the lofty ground which separates the drainage to the Indian Ocean from that which flows to the plains of Turkistân. On the east are the plateaux at 16,000 and 17,000, backed by the Kouenlen Mountains on the north, and by a less important range on the south. These plateaux, being isolated areas of drainage, constitute the watershed at this part. West of them the two systems of drainage have a simple line of separation. The space between the Shâyok and the watershed is occupied by very lofty mountain ranges, where peaks of 24,000 and 25,000 feet are not uncommon; the occurrence of these great altitudes for such a length and width as they are found to endow this tract one of the most considerable mountain-masses in the world.

Snow Map. $\frac{1}{4}$

In this map the area of country within the Maharaja's boundary is tinted in four different ways. One colour shows where no snow falls in ordinary years; another shows the parts over which snow falls and stays less than three months; a third colour shows where it stays more than three months, but does not produce glaciers; the fourth is the glacier-area.

I must be careful to explain what I mean by "glacier-area." It is the area from which the drainage of snow or of rain reaches to glaciers. I should like, instead of this, to have mapped out the area of perpetual snow, but I found I had not the data for it. The glacier-area, as above defined, is far wider than that of per-

1a Drew G-8 (1862-1872) 1875 AVI Kashmir AV/

petual snow, but at the same time we may know that (with very few, if any, exceptions) where glacier-area is marked there is perpetual snow within it, that the glacier-area is an extension of the area of perpetual snow.

The lines that bound the different areas must not be too much reckoned on as exact. The snow-fall is apt to vary in different years; I have endeavoured to represent a mean; the information was derived partly from my own observation, but chiefly from what was told me by the people; since the duration of snow much affects their occupations it is closely observed by them: this refers to the inhabited parts, which are mostly the valleys; where a line runs along the side of a mountain it cannot be taken as closely accurate, for a varying aspect towards the sun will cause differences which it would be almost impossible either to ascertain or to represent on a map. So the lines are only true as representing in a general way what they are designed for. The uppermost line, that which limits the glacier-area, is obtained from the larger map by marking off those parts from which snow falling and slipping, or rain falling and flowing, reaches to glaciers below.

The plain of the Panjáb is free from snow,* and so are the first ranges of the hills; but when we reach those which are nearly 4000 feet in height we find that snow falls upon them in the coldest part of the year, in January. Thus nearly all the Outer Hill region is left free, though some of the higher points of it catch the snow in ordinary years, and lower ones occasionally. It is on the outermost slope of the Middle Mountains that regularly every year a fall of snow occurs, and as the top of this slope is from 6000 to 8000 feet high, while the snow falls down to as low as 4000 feet or lower, a great vertical height of snow is to be seen on it after a winter's storm; but with the first sun the level of the lower edge rises, and the snow only stays in the higher parts where it fell thicker.

Thus the line that ends the area of no snow roughly coincides with the boundary, so far as a boundary can be defined, of the

* Since this was written news has reached us of snow having fallen at Lahor and Sialcotkur (winter of 1873-4). This I believe to have been particularly unprecedented.

1: Desw G-3. (1862-1872) 1875 AV1 Kashmir AV/

Middle Mountain region. But it will be seen that the general run of that line is indented in two or three places, especially along the line of the Chinâb; this denotes that the deep valley of that river, cutting through the mountains, reaches down below the level at which snow usually falls. The Jhelam Valley again (of which only one side is shown in the colouring) carries the no-snow area far among the hills. On the Indus, only the very lowest spot of the portion of its valley which comes within our ken is free from snow. Since this place is 4000 feet in altitude, and is more than two degrees higher in latitude than the parts we first touched on, the cause of the absence of snow can only be the greater dryness of the air, the smaller amount of precipitation.

The line that divides the less-than-three-months area from that where snow stays for three months or more is for the most part drawn along the face of mountains at a height of at least 10,000 feet. Something like that height is wanted for such an amount of snow to fall as will last for three months on the slopes exposed to the sun; but in the valleys (which are often deeply sheltered from the rays of the winter sun) a much lower altitude suffices. Thus in Pâdar, in the Chinâb Valley, at a level of a little over 6000 feet, snow stays for four or five months. The great inlet of the above line along the upper course of the Jhelam River denotes that the Vale of Kashmir is covered with snow during a less time than three months; the head of the valley, however, and the higher parts of the karewas, come on the other side of that limit. In the valley of the Indus, Skardû has snow for about two months, as I learn from Dr. Thompson's 'Western Himalaya.' In the Gilgit Valley I ascertained that its duration was less than three months until Gâkûj was reached, where it lasts for the whole of that time.

We next see that beyond the boundary lines pointed out there is an enormous area of country where snow stays for more than three months. In many parts of this five months is not an uncommon time for snow to cover the fields; in the upper villages of the Bhutnâ Valley six months is the duration; and at the village of Karim, near the head of the Hasora Valley, it lasts on

1: Drew G-S (1862-1872) 1875 AVI Kashmir AV

132 the fields for seven months; this is the longest on any cultivated ground.

The whole of Ladākh has been put in as under snow for more than three months; for certain portions of that country this is only true in the sense that snow falls and does not melt within three months; it happens that in parts of Rupshu snow falls so lightly, the covering of it is so thin, that before long, partly by evaporation and partly by the drifting of it by the wind, the valleys, even at the level of more than 13,000 feet, become free. This it is which enables the Rupshu nomads, the Chāmpās, to keep their herds and flocks through the winter without a store of fodder; their winter encampment is on the flat alluvium of the Indus, at a level of 13,800 feet, in a position where, though the cold is intense, snow does not fall thick, and it disappears by the twofold action of the air. In Nubrā also the snow is apt thus to disappear, and in the lowlands of that valley some pasturage can be got in the winter time. Still all these places I include in the area of more than three months, since melting of the snow does not take place.

It is characteristic of the snow in Ladākh generally that it is *fine-grained* and *dry*; the first quality must be due to the small absolute amount of moisture in the air at the time of precipitation, the second to the intensity of cold.

We now come to trace the highest of our lines, that which marks out the glacier-area, and at the same time we will consider the distribution of Perpetual Snow.

It has been explained in Chapter IX., that the Panjāl Mountains, though rising above 15,000 feet, are free from snow that permanently lasts, and no glacier now occurs among them; only signs occur that tell of the former existence of glaciers. The first line of mountains where glaciers occur is the Watershed Range. In the south-east part of this the great width marked with the tint of our glacier-area shows that here the glaciers are many and large. Going north-westwards we see that the width lessens; then isolated spaces only occur, which tell of small scattered glaciers lying in the hollows of the highest of the mountains; then comes

1; Drew G-3 (1862-1872) 1875 AV1 Kashmir AV1

a long space without any glaciers at all, which is where the height of the ridge has fallen to 15,000 feet; but at last, in the great mass of Nangā Parbat, is a wide and lofty area of glacier-making snow. Between this watershed and the range that makes the Turkistān watershed, is a wide space where glaciers occur but here and there by the highest peaks, and not over any great area. But on reaching the last-mentioned range we come to the widest part of the glacier-area. Here the mountains are of the most lofty, and the glaciers they give rise to the largest, in the world. Some account of one or two of them has been given in Chapter XVI., under the headings *Bāsha* and *Brāldū*. In the eastern part of this watershed, where the ground is more in plateaus, glaciers cease, and a way can be found from one drainage-basin to another without traversing glaciers or snow.

As to the height of the snow-line—the height at which the supply and the waste of snow balance one another—it has long been known that on the Himalayas it varies much.

Many years ago Lieut. R. (now General) Strachey,* established the facts that for the portion of those mountains between the Sutlej and the north-west frontier of Nepal the snow-limit was at these different levels for the three following positions:

On the south of the snow-belt	15,500 feet.
„ north „ „	18,500 „
„ southern face of Kailas (which is farther within Tibet)	19,500 „

He showed also that this was due to the less amount of snow that fell on the inner side of the range, as compared with the outer.

In these westernmost Himalayas which we are dealing with, we find quite corresponding differences in the snow-limit, though on the whole, in spite of a higher latitude by from 2° to 5°, the level of it is still higher. In estimating the level of the snow-limit it is necessary, as pointed out by General Strachey in the paper just referred to, to strike an average of the inequalities of the line,

* See Journal Asiatic Soc. of Bengal, vol. xviii.

1: Drew G-3 (1862-1872) 1875 AV1 Kashmir AV1

/3a which are caused by such accidents as the steepness of slope of the mountain and its aspect to the sun. In order to fix the limit for the largest possible area, I have, in addition to my own observations as to the occurrence of snow (which indeed are not numerous enough for the object in view, as they are only good for this purpose when made in the autumn—after the summer melting and before the fresh falls), drawn upon the G. T. Survey Map for information, going on this assumption, that where a glacier exists some of the mountain which gives rise to it must have perpetual snow.*

Let us now, for the purpose of following this subject over the large area before us, divide it into Zones, and consider each in succession.

1st Zone: the country outside, that is to the south-west of, the watershed of the Chīnāb and Jhelam on one hand and the Indus on the other.

2nd Zone: the mountains of that same watershed.

3rd Zone: between that watershed and the line of the Shāyok with its continuation along the Indus.

4th Zone: between the Shāyok-Indus line and the high land which makes the Turkistān watershed.

In the centre of the 1st Zone we have the Panjāl Range without perpetual snow, and this has several points between 15,000 to 15,500. To the north-west, on the ridge that separates Kashmir from Khāghān, it seems that there are heights a little over 16,000 without glaciers, while 17,000 produces them. Thus it would seem that for the 1st Zone 16,500 feet may be taken as the snow-limit, and this is supported by the facts of the range on the south-east, dividing Chamba from Pādar.

For the 2nd Zone, after the great mass of Nangā Parbat, we have a long gap without glaciers, where the watershed is made by

* Even if this assumption is not exactly correct we shall not be far wrong in following it. It is true one sometimes sees little glaciers in the bottom of amphitheatres of mountains which do not bear snow on their summits, but then one is almost sure to find snow-talusses at the foot of the cliffs, which must be continually reinforced, and perhaps never entirely melt; these cannot, therefore, be far from the limit.

1; Drew G-3 (1862-1872) 1875 AV1 Kashmir AV/

a ridge that averages less than 15,000 feet. As we come south-eastward the peaks on the Watershed Range rise, and when they reach the height of 17,000 feet glaciers originate from them; something under that, therefore, may be taken as the lower limit of perpetual snow, and thus we must conclude that there is, if any, little difference between the height of this in the 1st and in the 2nd Zones. 132

In the 3rd Zone we see a great *difference*, going from north-west to south-east, within the zone itself. At first the gap of the Indus Valley, and probably the comparative lowness of the range between Nangā Parbat and Tīlel, and again the Pass of Drās, have their influence in admitting moisture-bearing winds to that tract; so that between the Hasora Valley and Skārdū the snow-level is yet not more than 17,000. But beyond Suru, opposite to which the Watershed Range is lofty and can intercept the most of the moisture, we find peaks of 18,000 without any glaciers coming from them. Around Leh 18,500 on north aspects and 19,000 on southern ones is the height of the snow-line. Farther on, in the eastern parts of Rupshu and around Pāngkong, the height of it is 20,000 feet.

In the 4th Zone there is a variation corresponding pretty closely with that observed in the last. At the north-west portion the snow-line seems to be about 18,000 feet. As one goes south-eastward, especially when Nubrā and its great ridges are passed, the mountains must be at least 20,000 feet high, if not more, to retain snow continuously. And this would seem to be about the limit on the Kuenlun Mountains as well.

It follows from these last facts—of the snow-limit varying along the length of each of the last two zones—that the changes of the snow-line do not quite correspond with the different parallel ranges from which our zones were taken, that, for the part north-east of the Jhelam and Indus watershed, lines more nearly north and south would best divide the areas of different snow-line level. For although that Watershed Range is a great obstacle to the arrival of moisture-bearing, snow-precipitating, clouds, and the part within is far drier, and has a far higher snow-limit than

1: Drew G-3 (1862-1872) 1875 AVI Kashmir AVI

132 that outside, yet, from the gaps and partial gaps before mentioned, there is a wheeling round of the moist winds and clouds, which thus to some extent find their way round the flank of the range to the inner region, so far at all events as to affect its north-western portion.

Although, from the small area they occupy, the *snow-beds* which have been described in a previous chapter (Chapter XV., *General Observations*) have not on this map found a place, yet, in connection with the other snow phenomena, it may be well here to mention them and to state that they are found at about the level of 16,000 feet.

[192] I will now put down, for the convenience of travellers, the words representing, in some of the languages used among the mountains, the various states of snow:

	Dogri.	Pĭdari.	Kashmiri.	Ghorri.	Ladaki.
snow	barf.	dang.	shin.	hin.	khâ.
ice	kakar.	dangoth.	yakh.	ser.	châring.
glacier	saryún.	kandar.	kamuk.	kân or khân.	
avalanche	hiwán.	mâsl.	hinâl.	rud.	
crevasse	..	..	hir.		

Glaciers and avalanches not occurring in Dugar, the words for them are wanting in Dogri. The *d* in *dang* and the *d* and *t* in *dangoth* are cerebral; the *n* in *saryún*, *kân*, and *khân* is nasal.

RACE MAP. 1/A

101 131 563 This map shows the geographical distribution of the various nations that have been described in the different chapters of the book.

One of the tints given in this Race Map, and repeated in the two succeeding maps, denotes the portion of the Maharaja's territories which is quite uninhabited, and, with little exception, uninhabitable. This includes the great spread of the Kuenlun and Lingzhithang plains and all that width of mountain country which, continuous with it, extends to the north-west. Then there is the mass of mountain between the Shâyok and Indus rivers, the higher parts of which are quite unfrequented.

1/A [Cf. category 11C, End Map III -- Analyst]

2: Gervis T-3 (no date) 1954 AVI Kashmir AVI

fourteen thousand feet and none over sixteen thousand; at intervals on the Poonch side great masses stand out from them like bastions, making it difficult to believe that some giant hand had not built this wall.

Murree is a health resort, the place where pallid cheeks gain a pink glow within a few days, the resort which, because of its climate, makes Pakistan tolerable to the long-suffering European who serves there. The air is invigorating, there is usually a coolish breeze, and within a very short while those who have arrived there "just to laze the days away", find themselves suggesting long walks through the wonderfully interesting hills, past babbling brooks, along narrow paths which lead through pink-barked, scented pines, firs and shady trees to some "special spot of our own", probably one such as is often passed on the road-side where the rocks are black wet with water and green with slime, but decorated with masses of dainty, trembling maidenhair ferns which cling to them, growing out from every crack and crevice that will offer them a root hold; they are large leafed, with shining black, wire-like stems.

Those who stay there can sit and cool themselves in contemplation of the far distant snows and admire the beauty of the country lying below their feet and above their heads, with all its differing shades of colours and variety of the shapes of the trees; the smoke-like wisps of cloud which are blown and drawn by air currents up and down the slopes; the intriguing red roof-tops of a hill-station house among the firs and pines, and little gardens of the peasants, which are terraced down spurs of the mountains, and the winding tracks—those you had never realized existed—with the load-carrying coolies striding down with empty baskets on their back, or struggling up with a load, in their hands a T shaped stick on which to rest it when they stand, for the basket or package is carried high on their backs; a head strap across the forehead stops the load from falling back as they climb; once on the ground it would be impossible to lift back unaided.

Kohala, which is the next stage on from Murree, is nearly thirty miles distant. The descent from the hills is steep, and it squats, stuffy and airless, shut in between hills at a height of only eighteen hundred feet above the sea level. In summer it is

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unbearably hot, in June and July frequently reaching a temperature of 115° Fahrenheit, so that few people stop at the Dak bungalow. It is an important place on the route though, for here stands the custom's house. The bridge which spans the Jhelum passes from Pakistan to Kashmir: this is an unusual bridge which quite a number of writers have noted. There used to be a suspension type of structure here, but it was washed away, as are so many others which fall beneath avalanches or through landslides in those parts. The one which is now there stands out from one side—the safe side—and a light steel extension connects the nose of the bridge with the other mainland, so that in the event of a landslide, this light portion of the "bridge" goes, and can be quickly replaced.

After passing over the river the road winds along the left bank of the Jhelum; it is a grand piece of engineering, in parts passing through short tunnels blasted through rock massifs which rise sheer from the river below. In some places just a loose knit rock wall serves as protection from falling over the edge of a precipice into the raging river beneath, at others the rock has been carved out so that it overhangs; here the road is oftimes narrow, though in other places—fortunately on the bends—it is wide, with ample room to stop the car and admire the country, which is particularly grand with high, barren hills rising steeply on either side; lone farms and tiny villages seem to cling to the hill sides, with small, terraced fields close by. Sparkling streams come down like waterfalls from heights; in places the result is surprising in that many of these, though spread wide, high on the mountain side, gradually come together to join the main stream. All are glittering with crystal waters from the snows in springtime, and combined make it appear like a gigantic fan which shimmers as some great, invisible goddess gently moves her hands so that she might enjoy the cool and refreshing breeze. Through gaps in these hills can be seen the snow-capped peaks of the ranges in the distance, with here and there a glistening peak.

Twenty-one miles from Kohala, and eighty-five from 'Pindi lies Domel, the most northerly place on the road, which, for the last few miles is cut sheer out of the cliff face; here landslips are not unusual after the rains. This is the most suitable place to

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stop overnight if the journey is being divided up into two days; there is a State rest house with a number of private houses. The main road is joined by one from Abbattabad, one which may be used in the winter when the Murree hills are covered with snow; this road runs back to the north-west for about fifty miles to Abbattabad, and although rather narrow, is always open: it can be seen crossing the ridge above the river and towards the west. Here also the river Jhelum is joined by its largest tributary, the Kishenganga; about the same in size, both flow for a short distance side by side before marrying, then it is easy to pick out in the spring and summer months the Jhelum which is light brown with the muddy deposits it has gathered on its long passage through Kashmir, and the Kishenganga, a light, clear, greenish blue from the snows which have fed it. In the dry autumn the Jhelum is an opaque green, brought about by the large quantity of organic matter suspended in it, whilst the water of the other river is a peacock shade, still clear and transparent.

In the old days petty chiefs ruled the tribes in these parts, and they were forever at war with each other, even with their neighbours across the closest ridges; yet when outsiders attacked one of them, all would join together to protect their land.

Only a day's march to the west lies the Black Mountain frontier where lived the "Yagi" Pathan tribes who made this road to Kashmir far from secure. The Frenchman Jacquemont records that in his travels, which were in 1831, he was provided by Ranjit Singh with a strong escort to save him from being taken captive, from being held to ransom, or being blackmailed.

Fourteen miles further on is Gazhi, where some people prefer to stop the night, as it has another rest house, this one being rather beautifully placed in its compound just above the main road. One of the famous sights of the Jhelum Valley route used to be a great rope bridge which here spanned the river; this has now been replaced by a modern bridge. The scenery is quite different again. At three thousand feet the valley opens up; there are distant views of the wooded hills; it is greener, fresher and not unlike the English country roads and lanes; there is a crispness in the air, so that at night a blanket is needed;

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132 no longer does one sweat and lie restless on the bed. Of that part Bernier wrote in his letters of far back in 1660, "I find myself transported on a sudden from a torrid to a temperate zone, the mountains we were traversing being covered with every one of our plants and shrubs; I had almost imagined myself in the mountains of Auvergne". And of this journey Arthur Neve commented in his book, *Picturesque Kashmir*, in 1899, "Early in April, when the wheat is ripening in Domel, it is at Chakoti only in the ear, at Uri, though the fields are green, the deciduous trees are almost leafless and at Baramula snow may be lying in the hollows, the fields are bare, and there are all the signs of early spring". It is surprising to find poles fixed upright to the four corners of the bed, for mosquitoes are often found here, and in the autumn can be a pest to those who have not brought a net to cover the bed.

133 Between here and Uri there is some really lovely scenery, much of which is truly magnificent, with lofty peaks towering up on either side, the road at times snaking its way through narrow gorges in which the river Jhelum flows, at times placid and with great swirling pools of brownish water, at others foaming and rushing as it escapes through some close held ravine or rock, rock which is so hard that the centuries of wear has not widened it, so hard that it will turn an ordinary chisel with ease.

361 712 Uri has a delightful old rest house with electricity for lights and fans, a luxury the visitor had thought might be unknown in Kashmir after the smoking oil lamps and hand fans of late. The gorge of the river before Uri is reached is so narrow that it is easy to cast a stone across it; the rocks drop vertically down to the water, the mountain sides are just like great castle buttresses of rock which rise from the rushing Jhelum. The town stands on a triangular plateau which is several hundred feet above the river, and as one nears it, especially when the river is low, there are to be seen several of those sloping, plateau-like, great alluvial fans which run down to the water. Uri is nearly four thousand five hundred feet above sea level; once it was of importance, having its own Raja; now of no importance, the town has become little more than a large village. The fort is interesting though; its founder was at one

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people. Journeying along the haphazard paths which skirt the river banks, till the sheer cliff bars the way, and the track is forced thousands of feet over the mountain-top, one feels like a child wandering in the narrow and tortuous alleys which surround some old cathedral in England. 133

It is impossible within the limit of this article to deal in detail with the nooks and corners where men live their hard lives and raise their poor crops in the face of extraordinary difficulties. There are interesting tracts like Padar on the southern border, surrounded by perpetual snow, where the edible pine and the *deodār* flourish, and where the sunshine is scant and the snow lies long. It was in Padar that the valuable sapphires were found, pronounced by experts the finest in the world. Farther east across the glaciers lies the inaccessible country of Zāskār, said to be rich in copper, where the people and cattle live indoors for six months out of the year, where trees are scarce, and food is scarcer. Zāskār has a fine breed of ponies. Farther east is the lofty Rupshu, the lowest point of which is 13,500 feet; and even at this great height barley ripens, though it often fails in the higher places owing to early snowfall. In Rupshu live the nomad Champas, who are able to work in an air of extraordinary rarity, and complain bitterly of the heat of Leh (11,500 feet). [132] [135]

Everywhere on the mass of mountains are places worthy of mention, but the reader will gain a better idea of the country if he follows one or more of the better-known routes. A typical route will be that along which the troops sometimes march from JAMMU, the winter capital, past the Summer Palace at Srīnagar in Kashmīr to the distant outpost at Gilgit. The traveller will leave the railway terminus on the south bank of the Tāwi, the picturesque river on which Jammu is built. From Jammu (1,200 feet) the road rises gently to Dansāl (1,840 feet), passing through a stony country of low hills covered with acacias, then over steeper hills of grey sandstone where vegetation is very scarce, over the Laru Lari pass (8,200 feet), dropping down again to 5,150 feet and lower still to Rāmban (2,535 feet), where the Chenāb river is crossed, then steadily up till the Banihāl pass (9,230 feet) is gained and the valley of Kashmīr lies below. [487]

So far the country has been broken, and the track devious, with interminable ridges, and for the most part, if we except the vale of the Bichlāri, the pine woods of Chineni, and the slopes between Rāmban and Deogol (Banihāl), a mere series of flat uninteresting valleys, unrelieved by forests. It is a

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pleasure to pass from the scenery of the outer hills into the green fertile valley of Kashmīr—the emerald set in pearls. The valley is surrounded by mountain ranges which rise to a height of 18,000 feet on the north-east, and until the end of May and sometimes by the beginning of October there is a continuous ring of snows around the oval plain. Leaving the Banihāl pass—and no experienced traveller cares to linger on that uncertain home of the winds—the track rapidly descends to Vernāg (6,000 feet), where a noble spring of deep-blue water issues from the base of a high scarp. This spring may be regarded as the source of Kashmīr's great river and waterway, commonly known as the JHELUM, the Hydaspes of the ancients, the Vitastā in Sanskrit, and spoken of by the Kashmīris as the Veth. Fifteen miles north the river becomes navigable; and the traveller, after a march of 110 miles, embarks at Khānabal in a flat-bottomed boat and drops gently down to Srīnagar, the capital of Kashmīr.

The valley and surrounding hills.

Looking at a map of Kashmīr, one sees a white footprint set in a mass of black mountains. This is the celebrated valley, perched securely among the Himālayas at an average height of 6,000 feet above the sea. It is approximately 84 miles in length and 20 to 25 miles in breadth. North, east, and west, range after range of mountains guard the valley from the outer world, while in the south it is cut off from the Punjab by rocky barriers, 50 to 75 miles in width. The mountain snows feed the river and the streams, and it is calculated that the Jhelum in its course through the valley has a catchment area of nearly 4,000 square miles. The mountains which surround Kashmīr are infinitely varied in form and colour. To the north lies a veritable sea of mountains broken into white-crested waves, hastening away in wild confusion to the great promontory of Nanga Parbat (26,182 feet). To the east stands Harāmukh (16,903 feet), the grim mountain which guards the valley of the Sind. Farther south is Mahādeo, very sacred to the Hindus, which seems almost to look down upon Srīnagar; and south again are the lofty range of Gwāsh Brāri (17,800 feet) and the peak of Amarnāth (17,321 feet), the mountain of the pilgrims and very beautiful in the evening sun. On the south-west is the Panjāl range with peaks of 15,000 feet, over which the old imperial road of the Mughals passes; farther north the great rolling downs of the Tosh Maidān (14,000 feet), over which men travel to the Pūnch country; and in the north-west corner rises the Kājināg (12,125 feet), the home of the *mārkhor*.

On the west, and wherever the mountain-sides are sheltered

133 As one descends the mountains and leaves the woodland
241 glades, cultivation commences immediately, and right up to
• 132 the fringe of the forests maize is grown and walnut-trees
311 abound. A little lower down, at an elevation of about 7,000 feet, rice of a hardy and stunted growth is found, and the shady plane-tree appears. Lower still superior rices are grown, and the watercourses are edged with willows. The side valleys which lead off from the vale of Kashmīr, though possessing distinctive charms of their own, have certain features in common. At the mouth of the valley lies the wide delta of fertile soil on which the rice with its varying colours, the plane-trees, mulberries, and willows grow luxuriantly; a little higher up the land is terraced and rice still grows, and the slopes are ablaze with the wild indigo, till at about 6,000 feet the plane-tree gives place to the walnut, and rice to millets. On the left bank of the mountain river endless forests stretch from the bottom of the valley to the peaks; and on the right bank, wherever a nook or corner is sheltered from the sun and the hot breezes of India, the pines and firs establish themselves. Farther up the valley, the river, already a roaring torrent, becomes a veritable waterfall dashing down between lofty cliffs, whose bases are fringed with maples and horse-chestnuts, white and pink, and millets are replaced by buckwheat and Tibetan barley. Soon after this the useful birch-tree appears, and then come grass and glaciers, the country of the shepherds.

Karewas. Where the mountains cease to be steep, fan-like projections with flat arid tops and bare of trees run out towards the valley.
133 These are known as *karewa*. Sometimes they stand up isolated in the middle of the valley, but, whether isolated or attached to the mountains, the *karewa* presents the same sterile appearance and offers the same abrupt walls to the valley. The *karewas* are pierced by mountain torrents and seamed with ravines. Bearing in mind that Kashmīr was once a lake, which dried up when nature afforded an outlet at Bāramūla, it is easy to recognize in the *karewa* the shelving shores of a great inland sea, and to realize that the inhabitants of the old cities, the traces of which can be seen on high bluffs and on the slope of the mountains, had no other choice of sites, since in those days the present fertile valley was buried beneath a waste of water.

Lakes and springs. Kashmīr abounds in mountain tarns, lovely lakes, and swampy lagoons. Of the lakes the WULAR, the DAL, and the
241 Manasbal are the most beautiful. It is also rich in springs,
133 many of which are thermal. They are useful auxiliaries to the mountain streams in irrigation, and are sometimes the sole

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that the old bridges had weathered many a serious flood. Not long ago two of the bridges, the Habba Kadal and the Zaina Kadal, had rows of shops on them reminding one of Old London Bridge, but these have now been cleared away.

Srīnagar to Gilgit.

The distance by road from Srīnagar to Gilgit is 228 miles, and the traveller can reach Bandipura at the head of the Wular Lake by boat or by land. The Gilgit road, which cost the Kashmīr State, in the first instance, 15 lakhs, is a remarkable achievement, and was one of the greatest boons ever conferred on the Kashmīri subjects of the Mahārājā. Previous to its construction supplies for the Gilgit garrison were carried by impressed labourers, many of whom perished on the passes, or returned crippled and maimed by frost-bite on the snow or accident on the goat paths that did duty for roads. The journey to Gilgit before 1890 has been aptly compared with the journey to Siberia. Now, supplies are carried on ponies and the name Gilgit is no longer a terror to the people of Kashmīr.

From Bandipura a steep ascent leads to the Raj Diāngan pass (11,800 feet), a most dreaded place in the winter months, when the cold winds mean death to man and beast. Thence through a beautifully wooded and watered country, past the lovely valley of Gurais, down which the Kishangangā flows, the traveller has no difficulties till he reaches the Burzil pass (13,500 feet), below which the summer road to Skārdu across the dreary wastes of the Deosai plains branches off to the north-east. This is a very easy pass in summer, but is very dangerous in a snowstorm or high wind.

Descending from the Burzil the whole scene changes. The forests and vegetation of Kashmīr are left behind, the trees are few and of a strange appearance, and the very flowers look foreign. It is a bleak and rugged country, and when Astor (7,853 feet) is left the sense of desolation increases. Nothing can be more dreary than the steep descent from Doian down the side of the arid Hattu Pīr into the sterile waste of the Indus valley. It is cool at Doian (8,720 feet); it is stifling at Rāmghāt (3,800 feet), where one passes over the Astor river by a suspension bridge. The old construction was a veritable bridge of sighs to the Kashmīr convicts who were forced across the river and left to their fate—starvation or capture by the slave-hunters from Chilās. A little cultivation at Bunji relieves the eye; but there is nothing to cheer the traveller until the Indus has been crossed by a fine bridge, and 30 miles farther the pleasant oasis of Gilgit is reached.

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The Indus valley is a barren dewless country. The very river with its black water looks hot, and the great mountains are destitute of vegetation. The only thing of beauty is the view of the snowy ranges, and Nanga Parbat in the rising sun seen from the crossing of the Indus river to Gilgit sweeps into oblivion the dreadful desert of sands and rock. Gilgit (4,890 feet) itself is fertile and well watered. The mountains fall back from the river, and leave room for cultivation on the alluvial land bordering the right bank of the Gilgit river, a rare feature in the northern parts of the Mahārājā's dominion.

Another route giving a general idea of the country runs from west to east, from Kohāla on the Jhelum to Leh, about 5 miles beyond the Indus. A good road from Rāwalpindi brings the traveller to Kohāla, where he crosses the Jhelum by a bridge, and enters the territories of Jammu and Kashmīr. The cart-road passes from Kohāla to Srīnagar, a distance of 132 miles, by easy gradients. As far as Bāramūla the road is close to the river, but for the most part at a great height above it, and the scenery is beautiful. At Muzaffarābād the Kishangangā river joins the Jhelum, and here the road from Abbottābād and Garhi Habīb-ullah connects with the Kashmīr route. The road runs along the left bank of the Jhelum, through careful terraced cultivation, above which are pine forests and pastures. It carries a very heavy traffic, but owing to the formation of the country it is liable to constant breaches, and is expensive to keep in repair.

Kohāla to Leh.

From Uri a road runs south to the country of the Rājā of Pūnch, the chief feudatory of the Mahārājā, crossing the Hāji pass (8,500 feet). At Bāramūla the road enters the valley of Kashmīr, and runs through a continuous avenue of poplars to Srīnagar. In bygone days this route, known as the Jhelum valley road—now the chief means of communication with India—was little used. The Bambās and Khakhās, who still hold the country, were a restless and warlike people; and the numerous forts that command the narrow valley suggest that the neighbourhood was unsafe for the ordinary traveller. The construction of the road from Kohāla to Bāramūla cost the State nearly 22 lakhs.

From Srīnagar to Leh is 243 miles. The first part of the journey runs up the Sind valley, perhaps the most exquisite scenery in Kashmīr. Fitful efforts are made from time to time to improve this important route, but it still remains a mere fair-weather track. The Sind river thunders down the

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valley, and the steep mountains rise on either side, the northern slopes covered with pine forest, the southern bare and treeless. At Gagangír the track climbs along the river torrent to Sonámarg (8,650 feet), the last and highest village in the Sind valley, if we except the small hamlet of Nilagrar some 2 miles higher up. Sonámarg is a beautiful mountain meadow surrounded by glaciers and forests. It is a miserable place in the winter time, but it is of great importance to encourage a resident population. The chief staples of cultivation are *grim*, or Tibetan barley, and buckwheat. It is good to turn [illegible] to graze on the meadow grasses; for in a few more marches one passes into a region like the country beyond the Burzil on the road to Gilgit, a land devoid of forests and pastures, 'a desert of bare crags and granite dust, a cloudless region always burning or freezing under the clear blue sky.' The Zoji La (11,300 feet) is the lowest depression in the great Western Himálayas which run from the Indus valley on the Chilás frontier. Over this high range the rains from the south hardly penetrate, and the cultivation, scanty and difficult, depends entirely on artificial canals. The ascent to the Zoji La from Kashmír is very steep, the descent to the elevated table-land of Tibet almost imperceptible. For five marches the route follows the course of the Drás river, through a desolate country of piled up rocks and loose gravel. At Chanagund the road to Skárdu crosses the Drás river by a cantilever bridge, 4 miles above the junction of the Drás and Suru rivers, and about 8 miles farther on the Indus receives their waters. But the steep cliffs of the Indus offer no path to the traveller, and the track leaves the Drás river, and turns in a southerly direction to Kargil, a delightful oasis. Then the road abandons the valleys and ascends the bare mountains. The dreary scenery is compensated by the cloudless pale blue sky and the dry bracing air so characteristic of Ladákh. Through gorges and defiles the valley of Shergol is reached, the first Buddhist village on the road. Thenceforward the country is Buddhist, and the road runs up and down over the Namika La (13,000 feet) and over the Fotu La (13,400 feet), the highest point on the Leh road. Along the road near the villages are Buddhist monasteries, *mani* (walls of praying stones) and *chortens*, where the ashes of the dead mixed with clay and moulded into a little idol are placed, and at Lamayaru there is a wilderness of monuments. Later, the Indus is crossed by a long cantilever bridge; and the road runs along the right

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are sometimes seen. Geese are found in vast flocks on the Wular Lake in the winter, and there are at least thirteen kinds of duck. The goosander and smew are also found on the Wular Lake. There are six species of eagles, four of falcons, and four of owls. Kingfishers, hoopoes, bee-eaters, night-jars, swifts, cuckoos, woodpeckers, parrots, crows in great variety, choughs, starlings, orioles, finches (12 species), buntings, larks, wag-tails, creepers, tits, shrikes, warblers (14 species), thrushes (20 species), dippers, wrens, babbling thrushes, bulbuls, fly-catchers, and swallows are all familiar birds.

Among the reptiles there are two poisonous snakes, the *ringar* and the *pukar*, the bite of which is often fatal.

Fish forms an important item in the food of the Kashmiris. Vigne noticed only six different kinds, but Lawrence enumerated thirteen.

Temperature.

As the elevation varies from 1,200 feet at Jammu and 3,000 feet in the Indus valley at Bunji and Chilis to 25,000 and 26,000 feet on the highest mountain peaks, the State presents an extraordinary variety of climatic conditions. The local variations of temperature depend chiefly upon situation (i.e. whether in a valley or on the crest of a mountain range), elevation, and the amount of the winter snowfall and the period and depth of the snow accumulation. The effect of position in a valley or a mountain crest is shown by comparing the temperatures of Murree and Srinagar. The Murree observatory is about 1,200 feet higher than the Srinagar observatory. The mean maximum day temperature in January at Murree is 7° higher than at Srinagar, and the mean minimum night temperature 9° higher. On the other hand, in the hottest month (June) the maximum day temperature is 1° lower at Murree than at Srinagar, while the minimum night temperatures are almost identical. The diurnal range is 2° less in January, 7° less in June, and 14° less in October at Murree than at Srinagar. The slow movement of the air from the higher elevations into valleys more or less completely shut in by mountains tends to depress temperature at valley stations both by day and night considerably below that at similar elevations on the crest of the Outer Himálayas, and to increase the diurnal range most largely in the dry clear months of October and November, when the sinking down of the air from the adjacent mountains has its greatest effect, and is supplemented by rapid radiation from the ground. The effect of snow accumulation in valleys in reducing temperature is very marked. At Drás and Sonámarg, where the accumulation is usually large, the

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solar heat on clear fine days in winter is utilized in melting the snow and hence exercises no influence on the air temperature. At Leh, where the ground is only occasionally concealed under a thin covering of snow, the sun even in winter usually warms the ground surface directly and thence the air. The cooling influence of snow accumulation at Drās and Sonāmarg is largely increased by the rapid radiation from the surface. The mean daily temperature is lowest in January and highest in June or July. At Srīnagar the mean temperature of January is 33·1°. The mean temperature of the hottest month (July) at Srīnagar is 74·6°. The mean temperature in January and August ranges from 25·3° to 75° at Skārdu, from 3·4° to 64·5° at Drās, from 7·7° to 61·8° at Leh, and from 38·6° to 85° (in July) at Gilgit. The most noteworthy features of the annual variation are the very rapid increase in March or April at the end of the winter, and an equally rapid decrease in October, when the skies clear after the south-west monsoon. The diurnal range is least at Gilgit (19·8°) and Srīnagar (22·4°) on the mean of the year, and greatest at Drās (31·4°) and Leh (26·3°).

Rain and snowfall.

The precipitation is received during two periods, the cold season from December to April, and the south-west monsoon period from June to September. The rainfall in October and November is small in amount, and November is usually the driest month of the year. The cold-season precipitation from December to March is chiefly due to storms which advance from Persia and Baluchistān across Northern India. These disturbances occasionally give very stormy weather in Kashmīr, with violent winds on the higher elevations and much snow. The fall is large on the Pīr Panjāl range, being heaviest in January or February. In the valley and the mountain ranges to the north and east this is the chief precipitation of the year, and is very heavy on the first line of permanent snow, but decreases rapidly eastwards to the Karakoram range. The largest amount is received at Srīnagar, Drās, and Anantnāg in January. In the Karakoram region and the Tibetan plateau the winter fall is much later than on the outer ranges of the Himālayas, namely from March to May, and the maximum is received in April. The average depth of the snowfall at Srīnagar in an ordinary winter is about 8 feet. The snowfall at Sonāmarg in 1902 measured 13 feet and in 1903 about 30 feet. In April and May thunderstorms are of occasional occurrence in the valley and surrounding hills, giving light to moderate showers of rain. This hot-season rainfall is of con-

siderable importance for cultivation in the valley. From June to November heavy rain falls on the Pir Panjál range, and in Jammu chiefly in the months of July, August, and September. The rainfall at Jammu and Pánch is comparable with that of the submontane Districts of the Punjab. It is more moderate in amount in the valley, which receives a total of 9·4 inches, as compared with 35·7 inches at Pánch and 26·8 inches at Domel. The precipitation is very light to the east of the first line of the snows bordering the valley on the east, and is about 2 inches in total amount at Gilgit, Skárdu, Kargil, and Leh. Thus the south-west monsoon is the predominant feature in Jammu and Kishtwár, while in Ladákh, Gilgit, and the higher ranges the cold-season precipitation is more important. The tables on p. 82 show the average temperature and rainfall at Srinagar and Leh for a series of years ending with 1905.

Earthquakes are not uncommon, and eleven accompanied by loss of life have been recorded since the fifteenth century. In 1885 shocks were felt from the end of May till the middle of August, and about 3,500 people were killed. Fissures opened in the earth, and landslips occurred. Floods are also frequently mentioned in the histories of the country, the greatest following the obstruction of the Jhelum by the fall of a mountain in A.D. 879. The great flood of 1841 in the Indus caused much loss of life and damage to property. In 1893 very serious floods took place in the Jhelum owing to continuous rain for 52 hours, and much damage was done to Srinagar. An inundation of a yet more serious character occurred in 1903.

Earthquakes and floods.

The early history of Kashmir has been preserved in the celebrated *Rájatarangini*, by the poet Kalhana, who began to write in 1148. He gives a connected account of the history of the valley, which may be accepted as a trustworthy record from the middle of the ninth century onwards. Kalhana's work was continued by Jonaraja, who brought the history through the troubled times of the last Hindu dynasties, and the first Muhammadan rulers, to the time of the great Zain-ul-Abidin, who ascended the throne in 1420. Another Sanskrit chronicler, Srivara, carries on the narrative to the accession of Fateh Shah in 1486; and the last of the chronicles, the *Rájávalipataka*, brings the record down to 1586, when the valley was conquered by Akbar.

History. Sources.

The current legend in Kashmir relates that the valley was once covered by the waters of a mighty lake, on which the

Legends.

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Bhadrah or Bhagrah, already referred to. Sometimes we find in the villages a wandering minstrel (Bhat), who sings to the accompaniment of a guitar, or recites verses, often extempore, full of local allusions and usually full of flattery if an official or person of influence be present. Like most Orientals, the Kashmiris regard amusement as passive rather than active. They are glad to look on at a race or a game, but it is extremely difficult to induce them, athletic and powerful as they are, to take a part in any sport. They are not altogether to blame. In former days pastime was at a discount, and small mercy would have been shown to the man who suggested that life should not be all labour. Even in the pampered city of Srinagar the effervescence of youth was checked by Gulab Singh, who merely supported the old ward fights with slings and stones. The professional *akhārahs* are often keen sportsmen; and the boatmen of Kashmir will, when challenged, paddle till they drop rather than be beaten by a rival crew.

As already explained, the Jammu province consists of a fringe of lower land bordering on the Punjab Districts of Jhelum, Sialkot, and Gurdāspur, gradually rising by a succession of ranges of hills to the high uplands bounded by the mountains of the Himālayan range, across which lie Kashmir, Baltistān, and Ladākh. The variations of climate are great, and the staples cultivated naturally vary to some extent with the climate. Thus the lower tracts yield all the usual crops of the Punjab, while in the higher tracts saffron, buckwheat, and mountain barley are grown. In the warmer parts the mango and shīsham are found in large quantities; but these give place to apple and pear-trees, to the picturesque *deodār* and shady Oriental plane (*chinār*) in the colder parts.

The province may be roughly divided into three main divisions. The plains and *dumāl* hills consist of the *tahsīls* of Kathua, Jasrōtgarh, Samba, Rāmtirathgharan, Jammu, Akhnūr, Mirpur, and Bhimbar. In the hot moist tracts, such as those irrigated from the Rāvi and Ujh in the Jammu district to the south-west, sickness is so rampant that the resident population is too small for the cultivation of the soil, which is chiefly tilled by *adwant* cultivators, men from the low hills who descend to the plain for short periods to sow, tend, and reap crops, and return again to their healthier homes.

North of this lie the thinly inhabited by the hills and the cooler inland lowlands, crossed with many channels (*nullās*), which carry off the drainage of the uplands and become

Agriculture, Jammu.

Plains and lower hills.

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roaring torrents for a few hours after heavy rainfall, but at other times are broad stretches of burning sand. This tract depends for a full crop on timely and well-distributed rainfall.

The parched *kandi* hills are composed of a red loam, thickly strewn with round stones and covered with stunted growth of *garna sunaina* and *kokankar* bushes, broad-leaved species of trees, acacias, and in parts bamboos. The *ner* (*Euphorbia*) is used to hedge the fields and cobble-paved paths, and to keep the *nilgai* from damaging the crops. The soil is thirsty and dries quickly, as the land slopes and drainage is rapid. Frequent rainfall is necessary to ripen the crops, chiefly wheat, barley, and *sarshaf* (rape) in the spring, and millet and maize (on manured land) in the autumn; but rain washes away the soft earth and leaves the surface of the soil a mass of stones.

Where the *kandi* hills end, and before the first limestone ridge is crossed, there is a narrow belt of cool land lying in the valleys traversed by the clear streams which carry the drainage of the middle hills on the lower side. When the depth of soil is sufficient, excellent crops are raised and much of the land is irrigated; but on the slopes where the depth of earth is small, and the limestone crops up to the surface (*pathri*), cultivation is precarious. Too much rain causes the soil to become water-logged, as percolation is stopped by the rock bed; and during a continued spell of hot weather the rock surface becomes so heated as to burn the roots of the crops, which wither.

Irrigation.
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In this portion of the province wells are few, owing to their cost. Except in the lowland bordering on the streams deep boring is necessary, and it is common to find that the water is from 70 to 100 feet below the surface. The cultivators are not as a rule sufficiently well-to-do to undertake the expenditure necessary to sink such wells, and risk the failure of finding water. Since the introduction of the regular settlement, the Durbár has done much to encourage the sinking of wells by the grant of advances on easy terms.

In this way, however, are found the only considerable areas protected by irrigation. The natural difficulties to be overcome are great, as the lie of the land makes projects costly and difficult to execute. The lines of irrigation have to cross the drainage of the country, and it is not easy to secure the channels against damage from the *kandis* when in flood. Owing to this difficulty, the more ambitious projects of former days—the Kashmír canal taking off from the Jhelum above the

[for the protection of ... Ravi]

3: Imperial Gazetteer G-3 (1889-95) 1909 AV1 Kashmir AV1

Mádhopur weir, the Shâhi Nahr taking off from the left bank of the Chenâb opposite Akhnûr, and the Katobandi or Dalpat Nahr taking off from the Chenâb on the right bank—failed to render permanent help to the country. Something has recently been done to remedy the apathy displayed in the past. Two old irrigation works taking off from the Tâwi in the Jammu *tahsil*—the Jogi Darwâza canal irrigating the land immediately below Jammu city, and the Sarwari canal irrigating the villages round Satwari cantonement—have been realigned and put in order; and the Dalpat canal, taking off from the right bank of the Chenâb and irrigating a large portion of the Akhnûr *tahsil* lying immediately north of the Bhajwath Andar, has been reconstructed.

Under agreement with the Government of the Punjab the right of the State to take water from the Râvi, above the Mádhopur weir, for the irrigation of spring crops in the Kathua *tahsil* has been surrendered in consideration of an annual payment of Rs. 5,000. The restoration of the old Kashmîr canal, which takes off above the weir, is thus not financially attractive. Probably the low-lying portion of the Mirpur *tahsil*, known as the Khari Ilâka, could be irrigated from the Jhelum; but this source of irrigation has not been tapped.

There are many drawbacks to agriculture. The administration in the past was bad and shortsighted. There are practically no roads, and in the *kandi* tract even drinking-water is obtained with difficulty. Much damage is done by *sûjpai*, hog, and monkeys, the first-named animal, though an antelope, being regarded as sacred like the cow. Cattle turned loose, either as likely to die and of no further use, or devoted to the deity, have become quite wild and do much damage to crops. Hindrances to cultivation.

Above the first limestone range lies a country of wide valleys and high hills, consisting of Basoli, Râmnagar, Udhampur, Naoshera, and part of Riâsi. This has a more temperate climate than the tract just described. The supply of water by perennial streams is constant, but the stream beds are deep and irrigation is not easily effected. Being nearer the Himâlayan range, rainfall is usually heavy and fairly constant, so that the people do not trouble themselves much about irrigation, except where this can be contrived at little expense. The crops are much the same as in the plains, but *bájra* gives way to maize, and sugar-cane and turmeric disappear. The seasons are shorter. The areas of *pahâ* land, where the limestone bed approaches or approaches the surface of the soil, are con- Intermediate land.

siderable. Communications are backward and prices generally rule low. Trade is carried on by Telis, who keep droves of pack-bullocks or ponies. Grazing is good and the tract is frequented by Gūjars, goatherds, and shepherds. A considerable export of *ghī* takes place. Wild hog and monkeys do damage, but no antelope are found. Autumnal fevers are very rare.

Uplands. The higher uplands, including Bhadrāwar, Kishtwār, Rāmbān, part of Riāsi, and Rāmpur Rājaori, have a really cold climate, and in the winter snow falls. The cultivators are a different class from those in the plains and lower hills, and Kashmīri settlers are found. Here the mango-tree gives place to the apple; and the pear, the Oriental plane (*chinār*), and the *deodār* are found. The climate approximates to that of the valley of Kashmīr, and cultivation is on much the same lines. The specialities are saffron in Kishtwār, and poppy in Dodār, Kishtwār, and Bhadrāwar. This tract is healthy, and only in the more shut-in valleys do fevers trouble the people. Irrigation is general and the rainfall heavy. Grazing lands are plentiful and Gūjars numerous. Early snowfall and cold winds from the mountains affect the crops in the parts adjoining the Himālayan range, and prevent these coming to maturity in certain years. Bears, hog, and monkeys do some damage.

Kashmīr proper. Owing to its system of rivers, Kashmīr proper possesses a large area of alluvial soil, which may be divided into two classes: the new alluvial, found in the bays and deltas of the mountain rivers; and the old alluvial, lying above the banks of the Jhelum and extending as far as the *karewa*. The first is of great fertility, and every year is renewed and enriched by silt from the mountain streams. Up to the present, in spite of the lax system of forest conservancy, the silt of the mountain streams is rich and of dark colour; but the Sind river brings down an increasing amount of sandy deposit, which is partly due to the reckless felling of trees in its valley.

Soils. The Kashmīris, so far, have considered no crop worthy of attention save rice; by irrigation and manuring an artificial mould has been obtained for the rice-fields, and it is rare to hear anything said about the original soil. But they recognize four classes which require peculiar treatment when under rice-cultivation. These are known as *grūtī*, *bakil*, *sukil*, and *damwlad*. *Grūtī* soil contains a large proportion of clay. It holds water, and in years of scanty rainfall is the safest land for rice. But if the rains be heavy, the soil cakes and the outturn of rice is poor. *Bakil* is a rich loam of great natural

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TABLE I.—Temperature, Kashmír

Station.	Height of Observatory above sea-level.	Average temperature (in degrees F.) for twenty-two years ending with 1905 in							
		January.		May.		July.		November.	
		Mean.	Diurnal range.	Mean.	Diurnal range.	Mean.	Diurnal range.	Mean.	Diurnal range.
Srinagar * . . .	5,204	33·2	14·2	63·9	24·0	74·3	20·8	46·4	28·1
Leh	11,503	19·1	20·4	49·9	26·3	63·3	26·9	34·0	26·3

* The figures here are for fourteen to fifteen years only.

Note.—The diurnal range is the average difference between the maximum and minimum temperature of each day.

TABLE II.—Rainfall, Kashmír

Station.	Average rainfall (in inches) for twenty-nine years ending with 1905 in												
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of year.
Srinagar * . .	3·13	2·24	3·58	3·29	2·93	1·67	3·03	2·26	1·64	1·12	0·47	1·34	26·70
Leh . . .	0·33	0·32	0·30	0·20	0·21	0·16	0·47	0·47	0·21	0·18	0·03	0·17	3·05

* The figures here are for fourteen to fifteen years only.

State school badly housed, and a dispensary in a building wholly unsuited to the purpose. The town has a neglected appearance. The streets are badly laid, dirty, and undrained, and there are no attempts at conservancy. Trade is brisk. It is mostly in the hands of Mahājans and Khattrís. The chief articles of export to British India are grain, *ghi* from the hills and Pūnch, and minor forest products from Kotli, Pūnch, and Rājauri; the chief imports are salt, cloth, tea, and sugar.

Pūnch.—Principal place in the *jāgīr* of the same name, Kashmír State, situated in 33° 45′ N. and 74° 9′ E., at an elevation of 3,300 feet above sea-level. It lies on sloping ground above the right bank of the Tāwi. Population (1901), 8,215. The town is oblong in shape, and is unwalled, with narrow streets. There are about 750 houses, generally single-storeyed with flat mud roofs. The fort, in which the Rājā resides, stands on a mound about 300 yards from the south-west corner of the town. Pūnch is well supplied with water brought by channels from the neighbouring streams. The climate is hot in the summer, and the rice-fields in the neighbourhood are probably one of the causes of the prevalence of fever. During the five hot months it is the custom to migrate to the hills to the summer camping-ground known as Dhoks. There is a flourishing market and a large trade is done in grain and *ghi*, in spite of the fact that there are no roads in the *jāgīr* fit for cart traffic. A good six-foot road for pack transport has nearly been completed from the town to Uri on the Jhelum, and there is a project for a road to Rāwalpindi, with a suspension bridge over the Jhelum at Lachman Pātan. Other important tracks lead to Gulmarg and Tosh Maidān in Kashmír, and to Jhelum. The ancient name was Parnotsa, and the place is often mentioned in the chronicles. The Kashmíris always speak of Pūnch as Prunts.

Station.

Srinagar.—Capital of Kashmír State, situated in 34° 5′ N. and 74° 50′ E., at an elevation of 5,250 feet above sea-level. The city lies along the banks of the Jhelum, with a length of about 3 miles and an average breadth of 1½ miles on either side of the river. Originally houses were confined to the right bank of the river, and the site possesses many advantages, strategical and economic. It is not known when the extension on the left bank took place, but the royal residence was transferred to it in the reign of Ananta, 1028–63. Modern Srinagar, on the right bank, occupies the same position as the ancient city of king Pravarasena II, who ruled at some period of the sixth century. Kalhana, in his famous chronicle, says that the

4: Durand G-3 (1888-93) 1900 AV1 Kashmir AV1

had been marching steadily for four months and a half from the time we left Kashmir, and had covered nearly a thousand miles.

In a few days Robertson passed through on his way to India, Younghusband followed him shortly after, having safely accomplished the object of his mission, and Manners-Smith and I settled down to our first winter in Gilgit. Within a month the first heavy snowfall of the year came down, hermetically sealing the passes in our rear, and we were left, two solitary Englishmen, shut up in the wilds of Hindu-Kush. For weeks at a time no letters were to reach us; for six months the great snow barrier would prevent all possibility of help from India in case of trouble, and all that I had to rely on in the shape of an armed force was a body of two hundred Gurkhas of the newly-organised Kashmir Imperial Service Troops. Though of excellent material this little body was entirely undisciplined, untrained, and ignorant of the use of the rifles served out to it. The outlook was, however, peaceful, and I relied with confidence on the result of my visits to the neighbouring states. My confidence was not misplaced, and the winter passed quietly.

[In December -- Analyst]

133 bend round Nanga Parbat, where it assumes a south-westerly course. The mountains in the north stretch up to the Pamirs, and reach great heights; one of the peaks, Mt. Godwin Austin 28,250 feet above the sea level, is [134] the second highest peak in the world. The Himalayan ranges north and south of the Indus have been described as the "Sportsman's Paradise", where ibex, *markhor*, and ovis ammon, besides other big game, are met with. A number of mountaineering expeditions have been to these regions for exploration. Except in Gilgit, the ranges in this division vary from 17,000 feet to 22,000 [141] feet. The cultivable area in the Ladakh district is very small and the rainfall deficient, and agriculture is carried on by artificial irrigation. *Grim* (a kind of wheat) is the chief crop and is grown even at a height of 15,000 feet. The small tract of Gilgit enjoys good climate and cultivation, and produces wheat and other crops and fruits. The [142] area of the whole division is 63,554 square miles. The population is very sparse—the density at the census of 1941 was 5 persons to a square mile and the total population 3,11,478.

The first two of these divisions form the province of Jammu, the third is Kashmir proper, while the fourth comprises the district of Gilgit and the Frontier *illaqas* of Skardu, Ladakh, and Kargil.

132 **Climate.**—The climatic conditions of the country vary from the arctic cold of the Ladakh district to the extreme heat of the Punjab plains.

In the sub-montane and semi-mountainous tract of Jammu Province, tropical heat is experienced. Kashmir enjoys a temperate climate in summer, but is very cold in winter. In the Frontier district, especially in Dras, Zanskar and Rupshu, there prevails extreme cold. The deep narrow valleys between Kashmir and Gilgit are hot and damp. Kishtwar and Bhadarwah have a more salubrious climate.

Rainfall is scanty in the Frontier *illaqas* and the Gilgit district, but in the rest of the State it varies from 30 to 65 inches a year. Reasi and Poonch receive more than 60 inches each annually. The annual rainfall of the Jammu district is nearly 45 inches and that of Kashmir Valley varies from 30 to 35 inches.

Places of interest.—(A) The following are some of the

161 populous tehsils of the Kashmir and Jammu provinces and ultimately attain the top in the region of the Outer Hills where the Ramkotnaggarn tehsil records the maximum density of 327 persons to a square mile.

As regards the district densities the Jammu district (327) stands the highest, and is followed by Kashmir South (Srinagar district) density 274, Poonch Jagir, (230) Mirpur (212), Kashmir North (160), Riasi (131) and Chenani (118). The hilly districts of Muzaffarabad and Udhampur show a low average, the former recording a density of 90, while in the latter case the figure reaches only 54, the Frontier Districts conspicuously holding to their last position with 5 persons only to a square mile.

14. **Factors affecting Density.**—The various factors influencing the distribution of population are discussed below. The Census Commissioner for India in 1921 has pithily summed up the chief factors governing density in the following words :—

"In order to increase and multiply man must have certain essential conditions—water, food, clothing and shelter, a climate not fatally unhealthy and sufficient security of life and property to make it possible for him to settle and abide. All these factors interact upon one another and the absence of any one of them may counteract the influence of others. In India where the economic conditions are closely connected with the cultivation of soil, the physical configuration of the area must be a primary factor as continuous cultivation is impossible in a rocky or mountainous country".

2 It goes without saying that in a predominantly agricultural country like the Punjab and Kashmir where communications have not yet opened up the interior and the great industrial and mineral resources are still lying mostly untouched the growth of population may be said to be governed chiefly by the agricultural conditions namely :— Rainfall, Irrigation, configuration of the surface and the fertility of the soil ; and density is consequently directly influenced by the productiveness of the soil which is dependent upon a healthy combination of the above four factors.

162 (a) *Density and Rainfall.*—For agricultural countries, rainfall is one of the most potent factors in determining density as it acts upon the productiveness of the soil on which depends the sustenance of the surviving population. Although for obtaining high yields from agricultural production a certain amount of rainfall is essential yet it does not follow that produce will go on increasing with increasing amounts of rainfall, as excessive precipitation may instead of helping production bring in baneful results. The Indian Census authorities have opined that equitably distributed annual rainfall of 40" is sufficient in most parts of India. From the geographical point of view a country can be divided into four broad rainfall divisions, namely :—

(a) *Good Rainfall Division.*—Enjoying more than 80" of annual rainfall. In the plains, rice is everywhere the most important crop, and the hills are covered with thick evergreen forests of jungle.

(b) *Moderate Rainfall Division.*—With an annual rainfall between 40" and 80". Forests flourish in the hills and many crops can be grown in the plains without irrigation and there is a mixture of dry and wet area crops.

(c) *Poor Rainfall Division.*—With rainfall between 20" and 40" in the year. Here the dry area crops (Millet) grow ; wet area crops such as rice can only be grown with the help of irrigation. The hills are largely covered with scrub, because it is not wet enough for forests to grow properly.

4 [Errata : delete "the" (cf. Errata sheet, p. 222, category 14 — Analysis)]

132 (d) *Desert and Semi-desert Division.*—With less than 20" of rain. It is almost impossible to grow any crops at all without irrigation.

(e) According to the above standard there is no region in this State with a higher rainfall than 80" and we have to start with the second Division, namely the Moderate Rainfall Division (40" to 80"). From the accompanying table in which the tehsils have been arranged in order of the rainfall and their position with respect to density the data shown alongside it will be seen that the first seventeen tehsils commencing with Rajmahal down to Jamtara fall into this Division but with the exception of the Jamtara tehsil (307) whose density figures are inflated by the inclusion of Jamtara city there is no tehsil in this rainfall belt supporting a density of 300 persons. Furthermore out of 16 tehsils there are only four tehsils namely Jamtara, Ahiapur, Simdega and Mandhuland where the density is above 200 and the governing cause is no doubt rainfall coupled with the local character of the land surface providing greater extent of cultivable area, although in the case of the hilly tracts of Mandhuland the ordinary density of 226 is partly due to the working of the Kolhan mines. Persons on the large scale which pro-

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Rural No.	Tehsil	Rainfall in inches	Order	Density	Order
1	Rajmahal	57.68	1	346	XXIV
2	Rirsi	60.13	11	307	XXIII
3	Dumka	61.11	12	346	XXII
4	Sarayan Rajmahal	60.46	19	326	XVII
5	Chhatarpur	60.13	7	130	XII
6	Pir	60.05	11	167	XVIII
7	Kundahit	60.00	72	306	XX
8	Madhupur	60.00	132	16	XXV
9	Kolhan	60.00	11	100	XIV
10	Jamtara	60.11	2	304	VIII
11	Pakaur	60.00	22	10	XX
12	Deoli	60.00	222	110	XVI
13	Rakab	60.00	222	36	XXVI
14	Barhi	60.00	229	146	XI
15	Chandankiyari	60.00	27	110	XXI
16	Jarangarh	60.00	271	146	VII
17	Jasidih	60.00	272	201	IX
18	Kalgan	60.00	2722	146	X
19	Kodarmalgan	60.00	222	107	I
20	Sarandih	60.01	22	100	II
21	Nawadih	60.10	222	10	XXVII
22	Mandar	60.10	2222	201	XXII
23	Bagar	60.17	22222	146	VI
24	Pakaur	60.01	2227	104	IV
25	Jamtara	60.01	227	126	IV
26	Simdega	60.10	2271	146	II
27	Ko Jamgaidpur	60.01	2272	104	V
28	Kargil	0.00	22722	1	XXX
29	Mandu	7.00	2222	10	XXVIII
30	Hilsa	0.11	2222	10	XXIX
31	Lohardi	0.10	22221	1	XXXI

ide sufficient information for sustenance and livelihood of a population comparatively larger than that of other water hilly tehsils.

The fact that Rajmahal (71"), Rirsi (60") and Dumka (61") which get the highest rainfall stand very low with respect to density which is 106, 307 and 106 respectively, goes to show that the mountainous character of these tehsils leaves very little cultivable area to support large population and consequently the advantage rather the blessings of rainfall are seriously warped.

[Errata: Read "A" for "the"; cf. errata sheet, p. 327, corrigenda etc.—Analyst]

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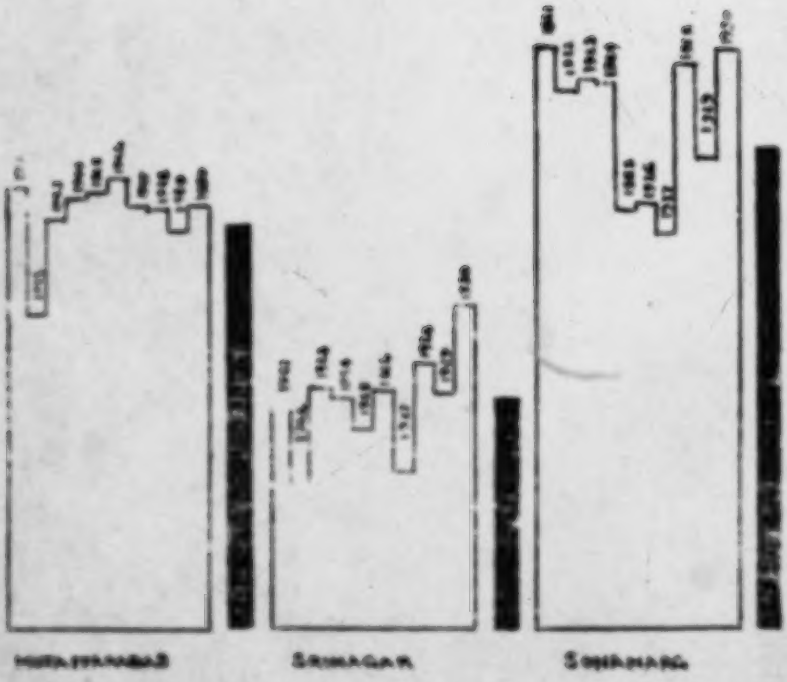
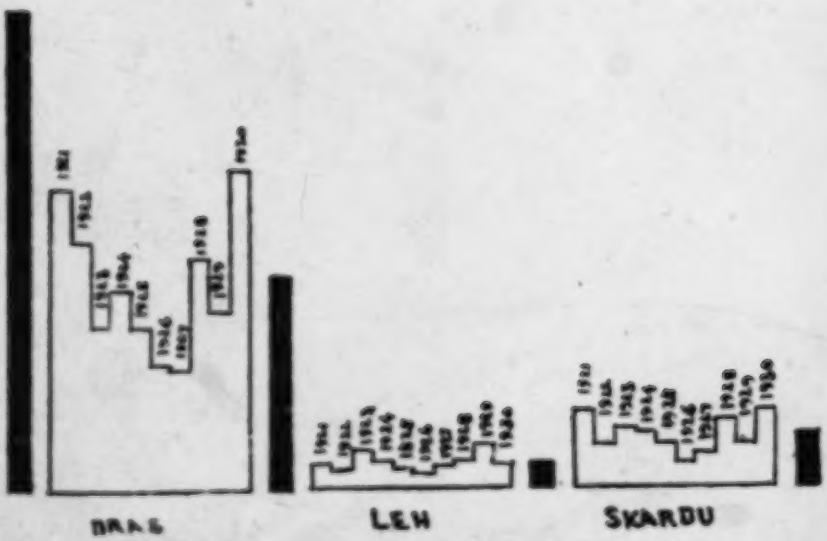
ANNUAL R



NOTE :- AVERAGE RAIN FALL FOR THE DECADE 1921-1930

[Facing p. 17: a]

132 RAIN FALL FOR THE DECADE 1921-1930



● SHOWN THUS ▬

[Facing p. 17: 6]

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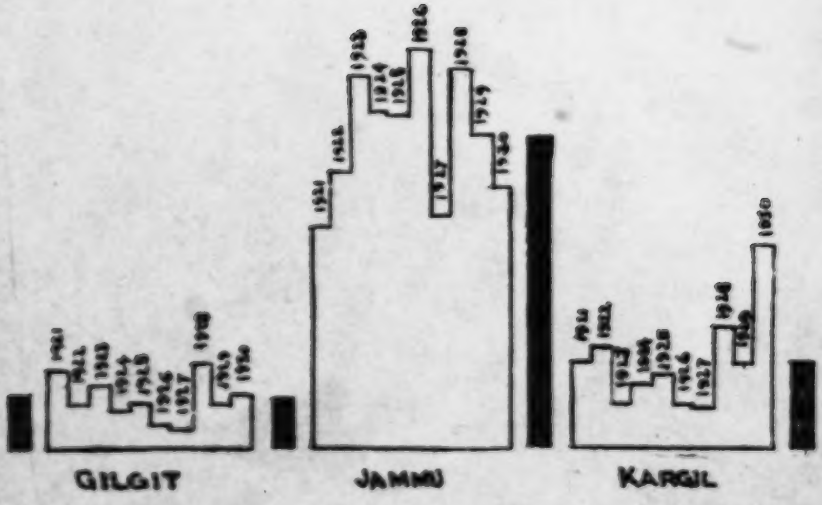

[Facing p. 17; c]

132 The cause of high precipitation here is that the Monsoon which manages to reach these outer ranges of the Himalayas is deprived of its entire acqueous vapour by these mountains on the Punjab side of the Pir Panjal preventing its onward march and penetration to the Happy Valley which is very slightly, if at all, influenced by Monsoons.

132 161 (b) The second belt classed as the Poor Rainfall Division (20" to 40") comprises ten tehsils which have a density above 200 excepting entirely mountainous tehsil of Kishtwar (18) and partly mountainous Anantnag. It is in this belt that the highy populated tehsils of Ranbirsinghpura (527), and Srinagar (501) are located as also the fairly dense tehsils of Pulwama (334), Sri Pratapsinghpura (334), Baramulla (252), Kulgam (248), and Mirpur (285). For Kashmir which has a temperate climate a rainfall between 15" and 40" is considered sufficient for all kinds of cultivation as in such regions both evaporation and rainfall are generally less and consequently the population all over the Kashmir Valley is fairly dense.

(c) Next comes the belt of a very poor rainfall (below 15") with Kargil (density 7), Skardu (13), Gilgit (19) and Ladakh (1) all of which come last in regard to density; Ladakh tehsil having a rainfall of 3" exhibiting one man per square mile. Here the relation between rainfall and density is self-evident.

The above shows that rainfall has a great influence over the growth of population in all tehsils povided other conditions are equal.

161 312 241 (b) *Density and Irrigation.*—For the conduct of cultivation, water is the essential element and where Nature is not liberal enough in the distribution of a fair quantity of rainfall artificial means of irrigation whether by canals, tanks or wells make up for the deficiency. Instances are numerous where barren and dry tracts of land have been converted into flourishing fields through the improved irrigational facilities and have in consequence attracted large masses of human settlers. Lyallpur in the Punjab with an annual rainfall of 13 inches had in 1891 a density of 7 persons to a square mile but during the last 40 years it has grown so populous that its density at 1931 Census has now reached to 368 persons and is still growing.

The non-reliability of Census statistics of the State before 1911 makes it difficult to properly appraise the effects of irrigational works in influencing the growth of population, but even during the last twenty years the increase of density in Ranbirsinghpura tehsil from 428 to 527 and that of Jasrotgarh from 241 to 281 and of Jammu from 313 to 387 is undoubtedly due in a large measure to the irrigational facilities afforded by the Ranbir canal and the Ujh and Basantpur canals in Kathua district.

133 161 (c) *Density and Configuration of the surface of land.*—Even where the supply of water by rain or irrigation is sufficint cultivation will not be full if the surface of the land is uneven. Throughout India, it is the level plains (of the Ganges, Punjab and other rivers) which are most thickly populated as in such places every inch of the land can be brought under the plough and water can be retained in the field to supply the moisture.

The table given under rainfall and density shows that in the State also it is the level plains at the foot of the hills in Jammu and the plains of the Kashmir Valley that support large populations while the hilly tehsils of Ramnagar, Riasi and Basohli etc., inspite of having highest rainfall are not thickly peopled on account of their hilly character.

132 161 (d) *Climate.*—The presence of masses of snow-covered mountains and the high altitude render the climate of part of Kashmir Valley very cold during the winter and the closing of the passes to the Frontier Illaqas during the

6:India G-3 (1931)1933 AVI Kashmir AVI

winter makes free communication almost impossible and under such circumstances the cold regions of the Frontier have little to offer by way of attractions for the growth of population which largely accounts for low density. Malaria which constitutes the chief cause of death in a majority of cases is greatly influenced by climate and consequently a malarial climate is perhaps the least conducive to the growth of population. Malarial climate of Kathua is an instance on the point.

(e) *Density and Crops.*—It is difficult to trace definite connection between the density and crops such as would lead to the formation of general formula on the subject ; and the hypothesis that "the tracts which can support most people are those where rice is grown", although challenged by various Census officers, has been found to be true to a certain extent in the case of the tehsils of the Kashmir Province by the last Director of Census of this State.

(f) *Historical and Industrial Consideration.*—History of a tract has exercised a great influence over the growth of population, as the civilized countries were strong and good Government ensures Law and Order with its concommitant blessings of security of life and property and impartial dispensation of justice between man and man will naturally encourage expansion of population not only by growth from the indigenous elements but also by a flow of immigrants from outside.

To these may be added the prospects of industrial development based upon the factory system of large scale production requiring the services of numerous workers which compels the movement of the rural population to the Industrial Centres and results in the creation of new towns and cities. Such growth of population is equally visible in parts of country newly opened out by railways and roads which create fresh avenues for trade and exchange of commodities encouraging the transport of surplus agricultural or mineral production to such places where they are scarce.

IV. Variations in Population at Previous Censuses.

15. For statistical reference the Imperial Table II and the State Table I may be examined as also the marginal table which shows at a glance the results of variation during the past 40 years.

Census years.	Population.	Variation per cent. Increase (+) Decrease (—)
1891 ..	[illegible]	Not available.
1901 ..	[illegible]	+ [illegible]
1911 ..	[illegible]	+ [illegible]
1921 ..	[illegible]	+ [illegible]
1931 ..	[illegible]	+ [illegible]

From the Report of the 1891 Census which was the first proper Census of the State, it appears that some sort of enumeration was conducted in the year 1873 but its results were far from reliable. The Report does not record any figures of population of this Census but from other sources the fact of an enumeration having been undertaken in 1873 at least of the Kashmir Province is confirmed and the results of this enumeration give a population return of 491,846 persons for the whole of Kashmir Province inclusive of Muzaffarabad district.

It requires no elaborate argument to establish the unreliability of these figures as a simple comparison with the population of the Kashmir Province at 1891 Census reveals that the count of 1873 places the population at a very low figure. It seems on the face of it incredible that the population of Kashmir Province should have increased during a period of 18 years (1873-1891) by about 100 per cent. i. e., from 491,846 to 949,041 in 1891 especially when the highest rate of decennial increase of population during the subsequent decades has on no occasion exceeded +26 per cent. in the Kashmir Province and this high percentage of variation has not been accepted as reliable by the subsequent Superintendents of Census of the State.

161 The total population of the State has during the last forty years undergone an increase of 4·73 per cent. which gives a decennial average of 9·45 per cent. which rate is quite normal and if maintained from Census to Census will double the population in about one hundred years. The percentage increase of 9·8 during the decade under review which has been the most favourable being conspicuous by its freedom from any serious visitations of epidemics such as Cholera, Plague, Influenza and at the same time blessed with good agricultural conditions barring of course a few local exceptions confirms the above view namely that the normal rate of decennial growth will range round 10 per cent. for the whole State unless any speedy industrialisation of the country and development of its mineral potentialities open up fresh opportunities for expansion of population at a higher rate.

161 132 **18. Causes of Variation.**—The causes of variation from decade to decade have been examined in detail in the previous reports and it is not necessary here to tread the ground afresh and consequently we shall make only a passing reference to them and revert to them in detail in the paragraphs explaining the growth of population by Natural and Administrative Divisions.

1891-1901.—Due to absence of rainfall gauges till 1895 no accurate past record of districts was available but the record thereafter shows that in 1898 the Jammu district, Bhimber and Jasrota districts suffered from drought which in 1899 brought famine conditions leading to the desertion of their homes by people of Kandi and Barani Areas. Cattle also died for want of fodder and scarcity of drinking water. Relief measures in the shape of suspension of Land Revenue to the extent of Rs.12,808, Taccavi advances upto 28,000 for purchasing seeds, bullocks and sinking wells and opening of Relief Works such as construction of roads from Jammu to Jasrota, Bhimber to Mirpur, Dalpat canal in Akhnoor tehsil were promptly introduced by the State which went a long way in ameliorating the distress of people. The decade was free from epidemics in the Jammu Province.

Kashmir Province.—Kashmir had timely rainfall during the decade excepting the year 1893 when the continuous rainfall for three days brought floods in the Jhelum which inundated several villages in the Srinagar district causing ruin and devastation. As a result of the Settlement operations the confirmment of the *Ansami Rights* on hereditary cultivators, the substitution of cash revenue for kind and introduction of systems of engagements direct with the *Ansamis*—doing away with the tyrannous interference of the middlemen brought in its wake the extraordinary betterment in the lot of the Kashmir peasantry by assuring them of fixity of revenue demand and security of tenure which hitherto they could not dream of.

[164] The visitation of Cholera in this province in 1892 A.D., caused a mortality of 11,712 souls in a few weeks but its 2nd attack in 1895, although responsible for carrying away 10,000 lives, was notorious by its continuing for a period of seventeen months. Introduction of vaccination occasioned considerable decrease in mortality from Small-Pox.

Frontier Districts.—The Frontier Illaqa was split up into two districts Gilgit and Ladakh. The rainfall here is of very little practical importance and the cultivation depends on natural water courses and irrigation therefrom. Astore and Gilgit were settled for the first time during the decade. The percentage increase of 14·21 was considered high by the 1911 Census Superintendent who placed the true increase at 12 per cent.

1901-1911.—The condition of crops in Kashmir was throughout good resulting in increased cultivation excepting the damage suffered by paddy crop of lower areas of the valley by the great flood of 1903. The Kashmir Province also experienced three Cholera epidemics resulting in 17,118 deaths and one attack of Pneumonic Plague of a severe type carrying away 1,455 persons. The Jammu Province had severe local famines and visitations of Malaria in the

[Vol. Th: 644 "Rs. before the figures, cf. ... above, p. 349, Category IV A — Analysis]

lower tracts. The Ranbir canal was thrown open in the Jammu Province but its effect on population were naturally above themselves in the adjustment decades. Percentage increases of 23 and 113 for Jammu and Kashmir Provinces and 8% for the entire State for the decade is quite reasonable and reliable. 161 132

1911-1921.—The normal rainfall was generally better than in the previous decade. The condition of crops in the State during the decade was about the average on the whole with the exception of the extraordinarily dry year 1920 which caused serious distress in some tehsils of the Jammu Province. The greatest suffering was occasioned in the tehsils of Kotli, Mirpur, Samba and Poonch Ilaqas and in a slightly lesser degree in the tehsils of Kishtwar, Ramnagar, Ramban of the Udhampur district. Liberal Taccavi advances were made through the Co-operative Department in the district of Mirpur for purchase of grain and cattle, among whom the mortality was very heavy, owing to dearth of fodder and desertion of the population to neighbouring districts in search of livelihood. State efforts supplemented by private charity succeeded in partially easing the situation, but the adverse effects of this long drawn suffering had an important bearing on the movement of population in the affected tracts. The total amount of Revenue suspended during the decade was Rs. 196,987 of which Rs. 130,750 was suspended in the Jammu Province".

The suspensions in the Frontier Districts and Kashmir Province amounted to Rs. 5,825 and Rs. 59,404 respectively while remissions throughout the State aggregated to Rs. 21,000.

Irrigational Extensions.—The decade witnessed an increase in the number of canals by 3, in total mileage by 60 and in irrigated area by 15,652 kanal which is a fairly satisfactory record of departmental improvement, greater share of improvement falling to the lot of Jammu Province as in Kashmir the natural water courses fed by snows require little further help by artificial means. In Jammu the Ranbir canal with 6 distributaries was completed in 1912; the Shamsipur canal in Kathua district was completed in 1917 and Ujh canal was started in 1919, while 6 distributaries from Upper Jhelum canal were laid out in Mirpur in 1916. 161 312 [477]

Public Health.—Out of the total 88,734 deaths during the decade influenza levied the heaviest toll (44,514 deaths) by causing 50 per cent. of the total mortality in 1918 and the disease held sway over both the provinces. Kashmir was free from Plague while Jammu had 9 visitations of this epidemic resulting in the total mortality of 6,134 persons in the decade. Cholera did its usual havoc in Kashmir and took away 18,084 lives—the 1919 attack being the most virulent. Small-Pox inflicted considerable mortality both in Jammu and Kashmir Provinces, the total number of deaths being 16,455. It is regretted that the absence of reliable vital statistics renders comparison with the past Census difficult. 161 164

Prices and Wages.—The exceptional feature of the decade was the abnormal rise in prices and wages during the War and the Post-War years as against the easy prices and steady conditions prevailing prior to 1914. The prices of food stuffs increased by 150 to 300 per cent. on account of the War and the wages of artizans and labourers were universally more than doubled. A person who received a daily wage of -/8/- could not be had for less than Re. 1 or even Re. 1/4/-. 458

Apprehending that the export of large quantities of food grains from the State to outside places where higher prices were obtainable will lead to considerable famine conditions the State had to place an embargo on the export of wheat, maize and rice. It is, however, unfortunate that the number of deaths in the War is not given in the Report on the absence of the able bodied population from their homes for a period of five years and the deaths of [Errata: add "to district" after "of grain" (last), p. 238, category 11a -- Analyst] 161 722

people in the prime of their lives constitutes very strong factors in reducing the birth-rate and the effects of War would naturally have been most disastrous on the population of the Jammu Province which supplies the ranks of the State Military. This factor greatly accounts for the small percentage increase of only 2·7 per cent. in the Jammu Province during the decade 1911-1921. In view of the above circumstances, the increase of 5·1 per cent. for the whole State during the decade was fairly satisfactory as compared with the average increase of 1·2 per cent. for the whole of India.

V. The conditions of the past decade 1921-1931.

17.—From a survey of the remote past we turn our attention to the closing decade 1921-1930 with which our Report is principally concerned and start with a general review of the agricultural, economic and seasonal conditions of this period in some greater detail since these exercise a substantial influence over the growth of population. The quantity of normal rainfall during the decade has already been shown by districts in the Subsidiary Table I and by tehsils in the marginal table under the paragraph dealing with Density and Rainfall. What remains now is to trace the course of rainfall during the ten years drawing attention to the exceptionally dry years as also to the good rainfall periods. Instead of giving a general account of these conditions for the whole decade it would be more advantageous to discuss them from year to year as far as possible in order to single out the good and bad years and avoid the confusion which the running account of such a long period involves. In preparing this brief account frequent help has been taken from authoritative sources such as the Annual Administration Reports of the State as also the Departmental notes obtained from the Heads of the State Departments for purposes of the Census.

The 1921 Census having been taken on the 18th of March 1921 corresponding to the Bikram date (Chet 1977) our review should naturally commence with the Sambat year 1978 but as only one combined Administration Report of the State was issued for three years 1977, 1978 and 1979, it will be advantageous to take these three years together and as also the subsequent 4 years' period till the adoption of Fasli year by His Highness' Government with effect from the 1st of Katik 1984.

Triennium 1977, 1978 and 1979 (1921, 1922 and 1923).—*Weather crops and general conditions of the people.*—In the Jammu Province the rainfall was untimely and deficient during 1977 causing damage to both the *Rabbi* and *Kharif* crops, but in 1978 and 1979 it was fairly distributed, timely and sufficient and in the last year the condition of crops was well above the average. In Kashmir the rainfall in 1977 was below normal and not well distributed partially damaging the *Rabbi* crops; in 1978 also unfair distribution damaged the *Kharif* crops; but in 1979 conditions of the crops improved by the advent of timely and sufficient rains. In Gilgit the abnormal rainfall and early snowfall of 1977 brought considerable misfortune to the *Rabbi* and *Kharif* crops though this very year gave equal distribution of rain and snowfall resulting in a good crop in Ladakh. 1978 proved, however, unpropitious as insufficient rainfall brought about a scarcity of food stuffs in Gilgit while in Ladakh crops suffered from excessive rainfall.

241 *Cultivated area.*—The total cultivated area in the State fell, from 2,036,080 acres in 1976 to 2,031,831 acres in 1977 and 2,031,424 acres in 1978 but rose to 2,036,084 acres in 1979.

164 435 *General condition of the people: Kashmir Province.*—The general health of the people was fairly good in there was no epidemic and the birth-rate was higher than the death rate. Prices ruled high in 1977 and experienced a slight fall in subsequent years 1978 and 1979. The rise in wages benefitted the mazdoors who, when free from agriculture took to labour. The number of live-stock increased.

Jammu Province.—Prevalence of severe famine in Sambat 1977 followed by diseases of various kinds increased the death rate and it was not possible for the population of the Kandi Illaqas to recover from the evil effects till Sambat year 1979 when the season took a favourable turn resulting in good crops. The abolition of *forced labour* or *begar* also proved a great boon for the cultivators. 731 161

Frontier Districts.—Prices were high and prevalence of famine conditions in 1977 and 1978 rendered the people destitute in Gilgit although in Ladakh the health of the people was better and the birth rate higher than the death rate. The burden of *begar* enforced for the sake of Supply and Transport Department is a sore vexation to the people and an impediment to agricultural operations.

Four and a half year's period—1980-1981-1982-1983 and first half of 1984 (1336-1985-1988-1987 and part of 1988).—Seasons.—In the year 1980 the rainfall in the Jammu Province was sufficient and well distributed there being no complaint even in Kandi tracts, while Nature caused belated sowings in 1981 but the position was restored in 1982 which gave sufficient and well distributed precipitation all over the province excepting portions of Reasi and Kathua districts where excessive and untimely falls affected the *Kharif* crops. In 1983 and first 6 months of 1984 the rainfall was irregular, the Mirpur and Kathua districts suffering from insufficiency of rain while abnormal rains in Reasi wrought much damage to life and property. 132

In the Kashmir Province the excessive rainfall in 1980 gave bumper harvests excepting the Anantnag tehsil, in 1981 the rainfall was comparatively much less but the deficiency was made up by sufficient snowfalls maintaining a richer and continuous flow in the irrigation channels and rivulets. In 1982 and 1983 and first 6 months of 1984 the precipitation was again sufficient and well distributed.

The Frontier Districts experienced scarcity of rains in 1980 especially in tehsil Kargil of the Ladakh district where the cultivated area decreased by 340 acres. In 1981 the fall was again not good but there was an increase of 344 acres in Gilgit and 58 acres in Ladakh in the area irrigated by *Kuhls*. In 1982 there was again shortage of both rainfall and snowfall but fortunately the crops which here do not depend so much on rain as on artificial irrigation did not suffer there being no decrease in the cultivated area. In 1983 and the first 6 months of 1984 the snowfall was heavier in the Gilgit district and the cultivated area increased by 600 acres.

Cultivated area.—The following table shows the variation in cultivated area during the 4½ years under review :— 241

Year.		Total area cultivated.	Variation.
1979	...	2,050,054	.....
1980	...	2,049,793	—261
1981	...	2,039,206	—10,587
1982	...	2,037,220	—1,986
1983	...	2,045,267	+8,047

It will be apparent that the figures of area under cultivation had suffered a continuous fall since 1979 and it was only in the last year *i. e.*, 1983 that an upward tendency began to demonstrate itself by an increase of 8,047 acres. The area cropped also decreased during these years from 2,099,113 in 1980 to 1,945,390 in 1981 ; and to 1,936,319 in 1982.

The General conditions of the people : Jammu Province.—The favourable season and good harvests of 1980 materially improved the condition

241 of people who for the past years were employed in the
[illegible] conditions. There are certain groups of
persons. The opening of [illegible] Coal Field which is
now commencing has [illegible]
164 work of the district. The [illegible] of Dunmow and Saffron
435 Walden where [illegible] work [illegible] to the
241 [illegible] addition to the slightly lower [illegible] in 1931 the
[illegible] is dependent on the [illegible] for the
[illegible] of the district. The [illegible] of land which
[illegible] to the agricultural [illegible] in 1931
[illegible] the right to grow of land grown.

Eastern Counties—In Eastern the year 1931 was remarkable for
[illegible], high wages, [illegible] [illegible] [illegible] for
the [illegible] of people and [illegible] [illegible] [illegible]
[illegible] for the export to British India for [illegible] [illegible]
[illegible] of a Dublin exhibition, the [illegible] [illegible]
[illegible] economic conditions which had for the [illegible] [illegible]
Paper in 1931 were well maintained during 1932 and 1933.

Premier Districts—Due to a mild attack of influenza in Clyde, the
[illegible] proved to be a healthy year [illegible] [illegible]
factory conditions. The people on [illegible] are generally [illegible]
only to the [illegible] being [illegible] and [illegible] to [illegible]
and industry as a [illegible] [illegible] [illegible] [illegible]
with [illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
1931, 1932 and 1933 were normal.

[illegible] Paid year 1934-35.—It is necessary to explain here the fact that
825 [illegible] Commission adopted the abandonment of the old financial year
[illegible] in the mind of the Paid year which commences with the [illegible]
of the financial year mainly on the [illegible] [illegible] with the [illegible]
Army. The first Paid year 1934-35 started with the [illegible] [illegible]
the middle of October) and is represented in [illegible] figures as [illegible]
and consequently the [illegible] for the years after 1931 are [illegible]
Paid years instead of financial years.

771 *Character of the Seasons*—The years 1931-35 proved very [illegible]
132 [illegible] for work over the [illegible] [illegible] [illegible] [illegible]
the valley [illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
connection with the [illegible] [illegible] [illegible] [illegible]
the annual [illegible] [illegible] [illegible] [illegible] [illegible]
during [illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
bridges for the [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible]

[illegible] 731
132

In the Jammu Province, the migration of [illegible] in their work during the year which had begun before the [illegible] at the time of the spring season [illegible] on work of unprecedented [illegible] in the month of [illegible] 1947 causing [illegible] and [illegible] to rise to [illegible] bringing [illegible] destruction to all the [illegible] in their course before the [illegible]. The [illegible] Camps were [illegible] many [illegible] destroyed, bridges and buildings destroyed and [illegible] the [illegible] by the [illegible] floods.

The Kulu crops had a severe [illegible] to the [illegible]. The general [illegible] 164
one of the people may on the whole consider public health being comparatively [illegible] on account of absence of any epidemic excepting the usual malarial [illegible] which is regarded as every day affair and are [illegible] up to [illegible] during the period of food [illegible] [illegible] and import of grains was [illegible] therein was kept free of [illegible] duty.

Rabi year [illegible]—For the Kashmir Province the year [illegible] harvests, 731
started with plentiful signs and the outlook being well-known and well distributed in 132
the earlier part of the year resulted in good crops all round and [illegible] [illegible] ready up for the requirements of the [illegible] year, but [illegible] harvested [illegible] of [illegible] were [illegible] by heavy rains in [illegible] bringing in their train floods of the same magnitude as of the last year followed by [illegible] loss to crops, cattle and houses. Scarcity of [illegible] caused much suffering in the [illegible]. Wheat, [illegible] maize and [illegible] [illegible] were also [illegible] with fairly good crops. Total [illegible] [illegible] by the [illegible] floods of 1947 and 1948 have [illegible] all for the Government to appoint a Board [illegible] for Famine [illegible], celebration of the [illegible] of [illegible] and relief works. The Famine Board also [illegible] on how the services of a Food expert whose [illegible] involving an expenditure of [illegible] has been sanctioned by the Government.

The prices of Kharif crops continued high while those of the Rabi [illegible] [illegible]
of some reduction. The prices of food stuffs are generally dependent on the 735
position on the price of Rice which is the staple food of the Kashmiris. 164
Even the bare price of Rice for the very inferior [illegible] which is the only [illegible] of grain is unfortunately hard to [illegible]. Inspite of the [illegible] of [illegible] to control [illegible] [illegible] [illegible]

[illegible]

[illegible]

[illegible]

D 141 The greatest increase in population has taken place in Kolh which registers a percentage of 227 increase over the last Census while Chibo on the other hand shows a fall per cent increase. The case of Nagar is an [illegible] showing an increase of six increase it shows a decrease of 316 persons or a variation of B 141 −393 per cent. In the [illegible] decennium therefore Nagar forms the one single exception of decrease of population in the State in contrast with all other tehsils which register all-round increases. The causes of variation have been explained by the Political Agent Gilgit in the following words:—

"All districts show an increase except Nagar which shows a decrease of 316. The increase are attributed due to the healthy annual life of the past 10 years, crops and security having been due not followed small epidemics of influenza in 1918-1919. Nagar, however, is undoubtedly showing the unfavorable point as regards population—upon land are being over sown. Moreover, the influenza epidemic in 1918 took large toll as did an epidemic of Typhus in 1920."

K 141 **66. General.**—Having attempted to offer a detailed analysis of the growth of population in the different Administrative Divisions such as Provincial Districts and Tehsils, and having also made detailed survey of the flourishing conditions of the details responsible for producing such happy demographic results obtained in new rips for us to take stock of the position and to bring the scattered data and arguments in a form to enable proper presentation into the more intricate problems of population about which a promise was held out by us in the opening portion of this discussion.

K ●[33] The causes of the highly favourable growth of population which is shown as par with the All India increase (The decennial increase in the State being 9·8 per cent against 10·6 per cent of India) have already been studied in detail in the paragraphs dealing with the "Conditions of decade" but it would be advantageous to briefly review them here so that the reader may have an opportunity to refresh his memory and be better equipped to appreciate the direct, indirect, timely and well distributed method (except for certain bad years of scarcity in the Skirps and to some extent in Kachna district) bringing good harvests to its even all-round a considerable improvement in the economic conditions of the agriculturist and highly favoured the growth of population during the last ten years.

A [illegible] Exceptionally favourable conditions of public health in the decade which was characterized by the absence of severe epidemics of influenza which during 1911-1920 inflicted grievous mortality here than the Great World War. Although Plague in the Jammu Province, Cholera in Kashmir, mild influenza and Typhus fevers, [illegible] [illegible] [illegible]

SUBSIDIARY TABLE I.

Lt Lawrence G-2 (1889-1892) 1895 AV4 Kashmir AV4
Kashmir AV1

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have been kindly supplied by Mr. John Eliot. The remarks on Murree and Leh are taken from Mr. Blandford's book on the Climate and Weather of India. The remainder of the notes are written by Mr. Eliot, and are based on the observations made at Srinagár during 1892 and 1893.

'Murree.—This is the chief sanatorium of the Western as Simla is of the Eastern Panjáb. It is situated on the summit of the ridge that divides the Jhelum Valley from the Patwar (the tableland above the Salt range), and commands an extensive view of mountain and plain. The hills around are well wooded except in the direction of the plains. None of those in the vicinity of Murree are of much greater elevation than the station itself, which stands nearly 7,500 feet above the sea. The observatory, which was established on its present footing in 1875, is at the Lawrence Asylum, the military school, and fully 1,000 feet lower than the station, on the crest of a spur that runs down towards the plains, and has a somewhat higher mean temperature than the station itself, while it is screened from northerly winds by the main ridge.

'Being thus situated on the crest of one of the outermost spurs of the Himalayas, its climate, like that of other Himalayan sanatoria, is of a very different type from that of Leh and Quetta. Although drier than that of stations such as Mussoorie and Naini Tal, similarly situated but further to the south-east, its atmosphere is much damper than that of the plains immediately below, and subject to smaller variations of temperature both annual and diurnal. The mean temperature of the observatory is 38°, in January and February 39°, and in June 71°. From this time it falls gradually to 65° in September, and then rapidly to the end of the year. The lowest temperature is generally reached in February, when the mean minimum reading is 34°. The lowest yet recorded, in 1886, is 16·7°. Owing to the comparative lightness of the summer rainfall, the temperature from June to September is higher than at the most easterly hill stations. Notwithstanding the elevation the shaded thermometer not unfrequently rises above 90° in June, and in 1880, a very dry year, registered as high as 98·7°. The diurnal range varies but little in the course of the year. It is rather smaller in the winter and in August, when it amounts to 14°, than at other times of the year, and is greatest in the driest months, viz. from April to June, when, however, it does not much exceed 17°. These figures, it must be remarked, represent the conditions of the observatory only, and it is probable that the amounts would be found to differ considerably, with differences of position and aspect, in different parts of the station, but those general characters which distinguish the climate from those of other hill stations are doubtless shared by all parts of the site.

'From June to November the air is much drier than that of Simla or any

3; Lawrence. G-8 (1889-1891) 1895 AV6 Kashmir
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000 CHAP. II. other hill station of the outer Himalayas, but in February it is apparently damper, and in the remaining months of the winter and spring of about the same character. The humidity is highest in August, when it amounts to about 80 per cent. of saturation. In March the skies are as cloudy as during the rains. In the spring months, from March to May, it rains on an average about one day in three, most frequently in April. The rainfall on each rainy day averaging about one-fourteenth of an inch. Rain is less frequent in June, but increases again in July and August, when about half the days are more or less rainy and the falls heavier than in the spring, averaging three-quarters of an inch on each day of rain. The number of rainy days has varied from 74 only in the dry year 1880, to 123 in 1885, and the total quantity from 39·1 inches in the former to 71·8 inches in the latter year.

'October and November are the clearest months, but even these, and every month up to May, are more cloudy than at Simla or on the plains. On the other hand, in July and August there is less cloud than at Simla or other more easterly stations, as might be expected from the smaller frequency of rain.

•132 [654] 'Leh[1]—Situated 4° further north than Quetta, and 6,000 feet higher, this station in the leading characteristics of its climate represents that of Western Tibet. Its observatory, 11,500 feet above the sea, is the most elevated in Asia, and has now furnished a register for twelve years.

133 311 '[1]Leh, the chief town of the province of Ladákh, is situated in the upper valley of the Indus, which is here from six to eight miles across for a distance of forty or fifty miles, and shut in on both sides by portions of the Tibetan plateau, averaging 16,000 feet above sea-level, and bearing some of the loftiest ranges of the Himalayas. The flats and terraces along the banks of the river are all cultivated, and dotted with numerous villages, but for a mile on each side, between the fields and the foot of the hills, is a waste of sand, gravel, and large boulders, similar to that which fringes the much lower hill ranges of Baluchistan, but on a larger scale. The town of Leh nestles under the hills north of the valley, at a distance of some four miles from the river, up a long gentle, gravelly slope.

[361] 132 'The atmosphere of the valley is remarkably clear and transparent, and the heat of the sun very great. There is generally a difference of more than 60° between the reading of the exposed sun thermometer in vacuo and the air temperature in the shade, and this difference has occasionally exceeded 90°. It has been mentioned on a former page that Dr. Cayley succeeded in making water boil by simply exposing it to the sun in a small bottle blackened on the outside, and shielded from the air by inserting it in a larger phial of transparent glass. Owing to the diminished pressure of the atmosphere at the elevation of Leh, this would, however, take place

[1] [Notes by Eliot. See category 116, p. 27 for identification of Eliot.—Analyst]

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at about 191° or 192°, or about 20° below the normal boiling-point at the sea-level. Chap. II.

'The mean annual temperature of Leh is 40°, that of the coldest months (January and February) only 18° and 19°; but it rises rapidly from February to July, in which month it reaches 61°, with a mean diurnal maximum of 80°, both in that month and August, and an average difference of 29° or 30° between the early morning and afternoon. The mean highest temperature of the year is 90°, varying between 84° and 93° in the last twelve years. On the other hand, in the winter the minimum thermometer falls occasionally below 0° Fahrenheit, and in 1878 reached as low as 17° below zero. The extreme range of recorded temperature is, therefore, not less than 110°.

'The air is as dry as at Quetta, and rather more uniformly so. In the driest month (June) the mean humidity is but 37 per cent. of saturation, and in the dampest months (January and February) only 61 per cent. But the skies are more cloudy than these circumstances would lead one to expect, and in no month does the mean cloud-proportion fall much below four-tenths of the expanse. The amounts of rain and snow are, however, insignificant. The average rain (and snow) fall is only 27 inches in the year, and twice that amount is the greatest yet recorded in any one year (1873), while in one year (1876) it was less than half an inch. It snows most frequently in January and February, but the falls are very light in the valley and soon disappear. Rain is most frequent in July and August, but even then it occurs, on an average, only on one day in ten, between one and two-tenths of an inch being the average fall of each rainy day. Agriculture is, therefore, almost entirely dependent on irrigation.

'The winds are generally light, and depend on the local direction of the valleys. At Leh, which stands at the entrance of the valley leading to the Khardung Pass, the most common directions are between south and west in the daytime and summer, and from north-east in the night, especially in the later months of the year.

'In January and February the air is generally calm, and April and May are the most windy months of the year.

'Srinagar is situated in the Kashmir Valley, at an elevation of about 5,200 feet. The valley is enclosed on all sides by mountains rising to an elevation of 15,000 feet and upwards, and is hence completely shut in, so that it does not share in the general air circulation of the Panjáb or Western Himálayan area. The winds are, in fact, chiefly from south and south-east, and appear to be mainly determined by the general direction of the river valley. The observatory was established in 1891, and hence the observations are too few in number to give more than the broad features of the climate of the Kashmir Valley. The mean annual temperature is probably 55°. The

[Notes by Eliot. See category IIb, p.27 for identification of Eliot -- Analyst]

In Lawrence G-0 (1895-1896) 1896 Kashmir

Chap. II. coldest months are January and February, when the mean temperature is 36° or 37°. It increases until the months of July and August, when it is 74°, and then decreases rapidly to the end of the year. It is probably slightly cooler than Murree throughout the year, except in the months of July, August and September. As might be expected, the diurnal range of temperature is in clear weather much greater than at Murree. In the cloudy weather of January and February it averages 15°, and is nearly the same as at Murree. It then increases to an average of 15° in April, May and June, when it is 6° more than at Murree. It decreases slightly to an average of 21° during the next three months of July to September. In the clear months of October and November it rises to 30°, when the diurnal range is twice as great as at Murree, and nearly as great as on the plains of India. With the return of cloudy weather in December it falls to a mean of 19°.

'The air is much damper at Srinagar than at Murree. The mean pressure of aqueous vapour for the year is about ·36", or 30 per cent. greater than at Murree. The mean humidity of the two years 1893-4 was 84°, whereas at Murree it was only 57°. The greater humidity of Srinagar is, of course, mainly due to its position in a closed-in valley on the shores of a large body of water. There is also more cloud at Srinagar than at Murree. The average cloud amount of the past two years at Srinagar is 4·6, whereas at Murree it is only 3·7. The climate by its humidity and greater cloud hence approaches more nearly to that of England than Murree. The most remarkable feature at Srinagar is the calmness of the air. Thus out of 730 observations of wind taken at Srinagar at 8 a.m. during the years 1893-4, 345 are recorded as calms, out of the remaining 385 observations 158 were from south or south-east directions, and eighty-one from the opposite or north or north-west direction.

'In the Western Himalayan mountain area the precipitation is chiefly received during two periods, and under very different conditions. The chief periods are the cold weather period from December to March or April, and the south-west Monsoon period from July to September. During the intervening period, April to June, thunderstorms are of occasional occurrence, and give what might be termed hot weather rainfall; but it is of comparatively little importance. The cold weather rainfall is chiefly due to storms of a somewhat peculiar character, their chief feature being that the precipitation increases with elevation up to 10,000 feet at least, and probably higher. On the other hand, the south-west Monsoon rainfall is heaviest at the foot of the Kashmir hills facing the Punjáb, and decreases with elevation, and also in proceeding into the interior, and is of little importance in Ladákh, Gilgit, &c. Hence, although

all parts of Kashmir receive rainfall during each of these two periods, the south-west Monsoon is the predominant feature in Jammu and Kishtwar, whilst in Ladákh, Gilgit, and the higher ranges the cold weather precipitation is the heaviest and most important. It occurs chiefly as snow in the Kashmir Valley and mountains, and on the higher ranges as much as forty to sixty feet of snow falls in a severe winter season. In the intermediate regions of the Kashmir Valley the rainfall is fairly distributed throughout the whole year. Chap. II. 182

"In Jammu the chief rainfall is the summer rainfall. In Kishtwar it is also probably the chief period, but the fall is more equally divided than in Jammu.

"In the Indus Valley the rainfall is always very small at Leh, but appears to increase in descending the valley, as the average rainfall at Iskardo (so far as is indicated by two years' data) is four times as much as at Leh. The rainfall at Leh and Iskardo in the Upper Indus Valley occurs almost solely during the cold weather, which there extends from December to April or May, and as a rule little or no rain falls in the period June to December. The rainfall at Gilgit is similar to that of Leh in amount, but, so far as can be judged, it is remarkable for the non-occurrence of rain in the cold weather, and its chief rain is due to scattered showers from April to September. The neighbouring mountains have frequent snow in the cold weather, and the melting of these snows probably enables cultivation to be carried on. At Srinagar the rainfall appears to be divided over the whole year. It has a good winter rainfall from December to March, light to moderate rain, probably from thunderstorms, in May and June, and occasional rain during the height of the Monsoon from July to the middle of September."

CHAP. II. The following data will give some idea of the climates of the countries by which the valley is surrounded, and show all that is known accurately about Srinagar itself.

Ls Lawrence G-8 (1889-1895) 1895 AV4 Kashmir AV4
Kashmir AV1

SRINAGAR.—MEAN MAXIMUM.

Date														
Highest														

6:Spate N-4 (no date)1954 AWI India
KASHMIR AVI

Sub-Himalayan Kashmir: Punch and Jammu

Very broadly speaking, Kashmir consists of two huge mountain masses —the Karakoram in the far N, the Himalaya/Zaskar to the S, with the Indus entrenched between them; and, on the Sn flanks of the main Himalaya, the famous Vale, walled in by the Pir Panjal which in turn breaks down into the lower but highly dissected Tertiary hills of the Punjab border (Figs. 63, 64). In actual fact the detail is exceedingly complex and the breakdown into seven units of study rather arbitrary, though not entirely so. 133

Kashmir includes a narrow strip, 5–15 miles wide, of the Punjab plains, here at 1100–1200 ft; this tract is badly ravined and of little significance except for the inclusion of the Mangla headworks of the Upper Jhelum Canal. N lies a belt of Siwalik terrain, hills up to 2000–4000 ft, largely anticlinal and overlooking a series of *duns*—longitudinal valleys—succeeded in turn by the Miocene Murree sandstones and Eocene Nummulitic limestone at 6000–8000 ft. The Siwalik zone, a "pile of rock waste" up to 20,000 ft thick, has undergone very recent folding and faulting, including early Pleistocene thrusting. In the earlier Tertiary zone strike-faults have disrupted anticlines and brought in massive Permo-Carboniferous limestones forming the higher ridges. The upper Murrees are preserved on the downthrow (Sn) side, while to the N the lower Murrees and the Nummulitics, resting with a great unconformity on the Permo-Carboniferous, are greatly disturbed and the terrain correspondingly confused; yet, "although dissection is intense, their heights display unmistakable [illegible] of an older topography. Levelled spurs and plateau remnants, valley flats and abrupt terminations of high valley floors along master streams, indicate a mature relief which underwent rejuvenation".[1] This sub-Himalayan zone ends in the great boundary thrust-faults, beyond which rise Pir Panjal steeply.

Rainfall varies with aspect, but in general lies between 35 ins. in the W and 28 in the E, with a fair contribution in January–March; temperatures are of course affected by altitude and aspect. The low outer ridges carry a sparse dry scrub, the inner rather better forest, largely *chir* or *chil* (*Pinus longifolia*); but felling for rafting into the Punjab has made serious inroads. 132

The Siwalik and Murree terrain, with thin thirsty soils, very liable to erosion and often degenerating into pebble-spreads, is agriculturally poor, as are the limestone slopes. Here and there, in *duns* and in a piedmont belt at the foot of limestone scarps, conditions are better. Irrigation is limited, so the water-table is generally deep for wells, and channels are liable to be overwhelmed by spates from the numerous transverse gullies; while some lower areas are so fever-ridden that cultivation is largely carried on by a 134 241

[1] de Terra (1932), 8, 18. Until further notice, citations to de Terra are from this very admirable work.

6:Spate N-4 (no date)1954 AWI India
Kashmir AVI
Vale of Kashmir

The climate is naturally continental, the severity of the winter being increased by drainage of cold air down the encircling slopes, and by radiation. Srinagar lies at 5200 ft and its climate is more extreme than that of hill stations lying 2000 ft higher on the outer Himalayan ridges: 132

134
137
139

Fig. 64.—Kashmir or the Vale of Kashmir. 1, mountain ranges (forest in S, grass or rock in N); 2, barrens; 3, marsh; 4, grass; 5, alluvial cone; 6, willows, poplars, orchards; 7, narrow lands; 8, irrigation channels (land); 9, flood embankment; 10, springs. All lands above embankment except cultivation and lands of barrens (cf. Fig. 66). Altitude about 5000 ft along Jhelum, 5800 on upper margins of barrens, 6000–7000 on hills. This map does not represent any specific year.

6:Spate N-4 (no date)1954 AWI India Research AVI

132 *Temperature ° F.*

J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	
30·7	33·0	45·1	55·7	63·9	69·9	73·0	70·8	64·0	53·2	44·0	36·3	Ra. 40·3

Precipitation, inches

2·7	2·6	3·6	3·8	2·3	1·3	2·2	2·3	1·6	1·2	0·4	1·5	Tot. 25·7

While the difference between the annual means at Simla (7200 ft) and Srinagar is less than 2° F. (55·1 at Simla, against 53·3), Simla temperatures for January, February, and March are 8·1, 7·6, and 6·4° above those of Srinagar, but those of July and August 8·7 and 8·0 less; the range at Simla is only 28·1°. Much of the precipitation is snow; the usual rains months (June–September) receive only 8·7 ins., January–March 9·1. It must be remembered that Srinagar is in the very bottom of the Vale, which as a whole receives 32–35 ins.

136 There is naturally a strong vertical zoning of climate and vegetation, and differences in exposure to insolation are most important. Immediately below the forests maize is the most important crop and walnut trees are numerous; at 7000 ft "hardy and stunted" types of paddy come in, to be succeeded by the better paddy of the lower terraces and the marshy tracts where the streams wind along through groves of willows.

241 The side valleys . . . have certain features in common. At the mouth of the valley lies the wide delta of fertile soil on which rice, plane-trees, mulberries, and willows grow luxuriantly; a little higher up the land is terraced and rice still grows, while the slopes are ablaze with the wild indigo, till at about three feet the plane-tree gives place to the walnut, and rice to millets. On the south bank of the river endless forests stretch from the bottom of the valley to the peaks; and on the north bank, wherever a nook or corner is sheltered from the sun . . . pines and firs establish themselves. Further up . . . maizes are replaced by buckwheat and Tibetan barley. Soon after this the useful birch-tree appears, and then come grass and glaciers, the country of the shepherds.[*]

Agriculture

911 Kashmir as a whole contains some 52 m. ac., of which 44 m. are unsettled or have no agricultural returns. Of the balance of 8 m. ac. about a quarter is cultivated, and a third of this quarter is in the Vale. Rice at lower and maize at higher levels are dominant, nearly half and over a third of the TSA respectively. Wheat has 10–11%, and the only other crops of much areal significance are linseed and rape.

241 Farming methods are very distinctive. Not much care (except the use of a rough rotation) is given to crops other than rice and garden produce. Rice is intensively manured, sometimes by piling farmyard refuse at the irriga-

[*] *Kashmir Gaz.* (1909), 6.

6:Spate N-4 (no date)1954 AWI India
Kashmir
AW

433 Zaskar also has its patches of cultivation, and is noted for its hardy ponies. The Deosai Plains "are mournful stretches of grass and stones, with many a bog difficult to cross, and uninhabited but for the marmots, an occasional bear, and swarms of big black gnats. The absence of wood for fuel, the distance from human habitations, and local superstitions regarding 'the devil's place' prevent the people from using the pastures." Such population as 221 there is in the Himalaya/Zaskar region is largely nomadic, and the shep- 132 herds of Rupshu "complain bitterly of the heat of Leh"—average annual temperature 40·9° F.[1]

Ladakh and Baltistan: The Indus Furrow

The Indus and the Ladakh Range: 'Little Tibet'

138 The Indus rises on the N∘ flanks of the Kailas Range, and flows in a great NNW curve until it breaks through that range to the Gartang confluence; this tributary continues the line of the main river through Kashmir, occupying a narrow corridor between the Kailas and En Ladakh Ranges. Below the confluence the Indus holds on a generally straight SE–NW course until the Gilgit joins it at Bunji and it turns to round Nanga Parbat. S of Lake Pangong, however, it makes a sharp bend and cuts through the Ladakh Range,[2] which it pierces again above the Shyok confluence. This great furrow is on the whole fairly graded; from the Gartang confluence to Bunji (*c.* 450 miles) the fall is only from *c.* 13,800 to 4000 ft, or about 20 ft per mile. Alluvial flats are found in the extreme E of its Kashmir course, at about 13,800 ft. In the E—Ladakh proper—the whole catchment as well as the immediate valley is narrow, constricted between the closed basins of Pangong and Morari; but in Baltistan the catchment widens somewhat. At Skardu, where the N∘ Shigar comes in a few miles below the Shyok, the

The Ladakh Range between the two Indus gaps forms a remarkably straight wall for some 190 miles: Indus and Shyok flow parallel 25–30 miles apart, and between them the range rises 10,000 ft or more to a rather even crest at 19,000 ft. Again the flanks, gentler on the N, carry evidences of a pre-glacial mature relief: "at 17,450 ft a rolling surface with valleys one to two miles in width separated by low divides . . . head-waters moving sluggishly around sand bars until they break through the terminal moraine-walls and fall at a rate of 1800 ft per mile through boulder-choked gorges." The relations between the abrupt slope—often of 1000 ft—in the valley-floors and the moraines indicate that these are old erosion levels, independent of ice action, but affected by later glacial uplift. The pre-glacial Indus

[1] *Kashmir Gaz.*, 3, 175.

[2] de Terra, however, thinks that the Ranga Lamla abruptly from NW/SE to WE just here (18–19, 22, 30, and Fig. 8), and his explanation seems valid. But the conclusions the accepted nomenclature of the RGS maps is retained.

valley-floor "must have been at the level of the flat spurs, which now are 3000 to 4000 ft above the valley." [1] The valley and foothills are largely formed of Eocene beds, dissected into sharp ridges which contrast strongly with the bolder granite forms of the mountain wall.

Climate

The climate of Ladakh may be illustrated by the figures for Leh, on a fan in the Indus Valley at 11,500 ft:

Temperature ° F.

J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	
17·3	18·8	30·9	40·9	49·8	57·8	62·6	61·0	53·7	42·7	32·1	22·1	Ra. 43·3

Precipitation, inches

J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	
0·4	0·3	0·3	0·4	0·2	0·2	0·3	0·3	0·3	0·2	0·0	0·4	Tot. 3·1

The absolute minimum is about minus 19° F.; mean annual pressure 20 ins.; mean relative humidity *c.* 40% from May to November, *c.* 70% in winter.[2] Farther W, around Skardu, conditions are a little less extreme. In the thin atmosphere insolation and radiation alike take place at an extreme tempo; mechanical disintegration of the rocks is rapid, and the saying that a bare-headed man with his feet in the shade can get sunstroke and frostbite simultaneously is hardly an exaggeration. Aspect and diurnal variation are of the greatest importance; many streams even in summer flow for only a few hours a day when the ice melts in their gravel beds. Vegetation is extremely thin: a few bushes, a kind of furze (*burtse*), stunted cedars,[3] willows, alpine pasture: "timber and fuel are the most pressing wants of the people."

But it must be remembered that bare climate, like nearly everything else, is 'vertical' and the mountains receive a fair precipitation: "the vertical diversity of the climate makes human life possible in Indian Tibet. To the east, where the mountain ranges die out, the country is too dry for any permanent settlement." [4] Without the glaciers and snow-fields even the W would be a desert; and even so the life of the region is in a sense an oasis and caravan life.

The Human Response

We are really neither in *India* nor in Pakistan, but in Tibet: Baltistan, it is true, is mainly Muslim, but in Ladakh proper are two-thirds of the sub-continent's 64,000 Buddhists, and Buddhist culture extends as far W as Kargil in the Dras valley.

[1] *de Terra*, 33–36.
[2] W. G. Kendrew, *The Climates of the Continents* (1937 ed.), 130–31.
[3] G. E. Hutchinson, *op. cit.*, 127–28.

6:Spate N-4 (no date)1954 AWI India
Kashmir AVI

133 But a grander event than simple river-capture must be sought . . . to explain the similarity of the inhabitants of the Indus and the Tsang-po. The flat-edged shoulders of the Chang-chenmo mountains, where butterflies circle around pinnacles of rock, suggest the nature of this occurrence, though they lie aridly in the air, far above the homes of the few fishes that inhabit the stream below. Such flat ridges represent the levels of the valley floors before the last upward movements of the mountains. . . . The remains of such valley floors may be found throughout Indian Tibet. They all record the same history. All the rivers of the land ran toward the Tibetan plateau. . . . Not until quite recent times, when the mountains rose high enough to cut off the rain from the inner deserts of Central Asia, were the more northern of these streams dried up. Then, across the ever-growing Himalayas, gorges were cut . . . draining away the waters of the older rivers. In this manner erosion and earth movements have moulded the pattern of the present Indus, and have cut out the path by which the traveller enters the western confines of Tibet.

133 The physical characteristics of the Karakoram glaciers have already been discussed (above, 26–28); we may note further the contrast between the 132 generally clear ice of the En Himalayan glaciers, girdled by forest and alp, and the Karakoram icestreams set in barren disintegrating rock and hidden beneath a mass of debris and wind-borne dust. The rivers emerging from their snouts flow over, or more often through and under, great ribbons of shingle. In winter, of course, the entire landscape is frozen, rigid, dead; in summer the streams wake only when the weather is clear. Cloudiness reduces evaporation, and the cold drizzly rain melts little snow; but with a few hours' sun the streams come down in sudden dangerous freshets. The Shyok itself, "a clear rushing stream thirty feet wide", is intermittent in this fashion: "We looked again, but there was no river. Yet even as we were talking about it, a new stream came pouring down a dry channel, a red muddy flood of freshly melted snow." [42]

133 There is, however, much evidence, morainic and other, of significant climatic change. Pangong at present consists of several lakes separated by deltaic fans, and for the most part is saline; there is no outlet. But beaches at various levels up to 200 ft bear witness to great oscillations, the most notable of which (in the Riss-Würm interglacial) must have allowed it to drain into the Shyok; the tendency has been to desiccation, not without fluctuations. Thus the patina on a palaeolithic artefact from Kargil speaks of aridity, while the representation of deer (with yaks and ibexes) on the sculptured rock at Tankse in the Harong valley suggests that within very recent times conditions have been more favourable to human activity; no deer are now found nearer than the Vale. There was a drier period at Pangong in the last century, but in other places there seems to have been no significant change, to judge from patches of dead ice which have not altered much since 1848. [43]

[42] Huntington, *op. cit.*, 74. [43] Cf. also T. Longstaff, *This My Voyage* (1950), 165.

132 Baltistan, the country between the Nu Shigar and the Indus, is slightly
136 more favoured than Ladakh, with c. 6 ins. precipitation and more glaciers;
but it is still very harsh. The valleys at 8000–10,000 ft have a few patches
of pine and deodar on the slopes, willow and poplar along the streams.
241 Agriculture depends on the snow, which lies from mid-December to mid-
March; in winter many villages are reached by the sun for barely an hour or
two a day, but in summer the heat in the narrow rock-walled valleys—
especially around Skardo—is intense. The usual crops, with ordinary and
naked barley prominent, are grown, a spring and an autumn crop where
water is sufficient. Lucerne, carefully tended, is important, but except for
intensive manuring of the sandy soils farming is extremely primitive, and
rotations unknown. The hot summer enables a wide variety of fruits—
peaches, melons, grapes, above all apricots—and even a little tobacco to be
grown. But the absence of the demographically restrictive social institu-
[316] tions of Ladakh keeps the Baltis miserably poor. Here and there washing
for alluvial gold eked out incomes a little, or at least enabled revenue
demands to be met.

241 To the E conditions get progressively worse. Around Pangong there are
361 a few fields of barley and peas on the lees at 14,000 ft or a little more; at
Tankse "the few houses that constitute the village seem to hide behind a
little grove of willow trees planted on one side of a stream, as if these trees
were the greatest treasure of a place that wished to put up a brave front, a
green and damp façade, to the hostile dry world before it". But on the
136 plateaux NE of Pangong even pastoralism is difficult. The Changchenmo
Valley has some vegetation: tamarisks on the floodplain, *burtse* on the slopes,
and just below the snow-line some flowering plants and patches of grass,
[133] shared by tame yaks and wild asses. Here and there hot springs "water the
gravelly plains into producing a little green grass . . . so precious that each
patch has a name." **

439 Yet this most negative of regions has its place in human history. The old
trade to Yarkand and Kashgar is dead or dying, but at the hands of man
himself: politics in Sinkiang and Kashmir are responsible for its decay, not
the desolate leagues of rock and ice nor the murderous winds of the Kara-
korum. The passes are open for only five or six months of the twelve; but
over them, carried on yaks or even sheep, travelled jade, lamp, and silk
from China; from India goods from the bazaars of Srinagar and Amritsar,
788 sugar and salt; borax from the dead lakes of Rupshu. Goods of low bulk,
but to many of highest value, also traversed this, one of the strangest
pilgrim routes of the world. Chinese disciples of the Enlightened One, seek-
ing the shrines of Peshawar and Sarnath and Buddh Gaya or the libraries of
Taxila, fought their bitter way over these savage gables of the world; and
here too came Christian men, perhaps fleeing from the tide of Islam, per-

** Hamilton, *op. cit.*, 106–07, 128–38. For the facts of the next paragraph, *ibid.*, 108–11.